DIGITAL PARTICIPATORY PLATFORMS IN URBAN PLANNING

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Abstract

Digital technologies for public participation in the form of 3D and 2D geoparticipation, generalist/multifunctional and bespoke digital portals are increasingly being harnessed by local government to crowdsource local knowledge and engage the public in urban planning policies as a means of increasing the transparency, legitimacy and effectiveness of planning processes. These forms of public participation initiated by local government typically go beyond statutory requirements and provide evidence of a participatory turn in urban planning practice. Current innovations are such that they outpace research about the effectiveness of digital engagement in participatory planning practices.

Through a qualitative meso-investigation about the use of digital participatory platforms (DPPs) in urban planning, this thesis contributes much-needed empirical evidence based on 29 online survey responses and 54 interviews with a total of 83 planning professionals for 25 digital platforms deployed in 61 use-cases in cities across Europe, North America and Australia. Additionally, interviews with 13 software providers provide cumulative insight about DPP use-cases. The findings indicate that objectives for using DPPs are multiple, context-dependent, and relate to perceived levels of influence. DPPs' influence on urban planning processes and decisions is typically indirect in that they are typically used as part of an ecosystem of tools for public participation, as part of continuous processes of innovation and experimentation. Theoretically, the research reconceptualises digital platforms for public participation as hybrid socio-technical systems. The thesis also provides valuable recommendations for planning professionals and software providers to better take stock of the identified socio-technical interdependencies and help improve DPP workflow integrations. The combined empirical, theoretical and methodological findings highlight that planning workflows and processes both shape the use of DPPs and are reshaped by them through recursive processes of DPP innovation.

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Digital technologies pervade every aspect of our modern lives. Over the past ten years, digital participatory platforms have increasingly enabled citizens to participate more actively in urban planning. Although their potential to transform planning practices and improve decision-making is widely praised, there remain significant gaps in empirical knowledge to assess their capacity to involve citizens beyond statutory information and consultation. This PhD offers a modest advancement of knowledge toward that end, with the hope that more studies (including more ambitious studies) will follow suit. By assessing what has already been done more systematically, one is better equipped to design more effective participatory processes. These can in turn shape decisions that speak to the many and can build capacity through higher quality public participation in the long run. The stakes are many, not least of which the great environmental, socio-economic, cultural and even spiritual challenges and opportunities that city dwellers will face for decades to come.

I dedicate this thesis jointly to my mother, for her unconditional love, support and understanding; and to my late father, who moved to new horizons many years ago, all too soon, on the eve of winter. There wouldn't be much of me to speak of, or any of this work, if it weren't for their care, dedication and generosity, or that of my forefathers. May they, and all beings, be blessed with boundless Love, Peace and ever-growing, unshakeable Joy. May all beings always meet and bless the Source of this Love, Peace and Joy at all times in the secret of their heart. When the good times roll, just as when things seem to fall apart. Peace is always within reach, here and now.

An opportunity to say 'thank you' and express gratitude should never be missed. The dedication extends to my brother, for his always renewed positivity, good humour, courage and pragmatic and moral support throughout all those years. Every younger brother needs a superhero as a sibling. The rest of my close, intermediate and extended family all also have their share of goodness, generosity and hospitality manifested in this piece of work. Along with all my spiritual teachers over the years, my former university and school teachers, countless friends as well as all the people I have failed to appreciate fully, I thank everyone for having contributed to shape my ideas, morale and aspirations for the (much) better.

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And as a PhD goes through its roughest troughs, it also helps to remember the Yorkshire idiom: *where there's muck, there's brass.*

Profusive thanks also to my many 'doctors-in-the-making' friends, colleagues and acquaintances who have contributed through direct support with reviewing various aspects of this work, their simple encouragement, good humour, or just by being who they are. I will name everyone here, though not individually, for fear of forgetting anyone. My heartfelt gratitude to the 'Dungeon Ascended' PGR group at ABE at Northumbria, and everyone I was blessed to meet at SEED at KTH (formerly Land & Water Resources – *Mark- och Vattenteknik*). Special due thanks also to my former Masters supervisor at KTH, Pfr. Berit Balfors, and also to Pfr. Ulla Mörtberg. You have helped me to grow as a researcher in the making and inspired me by always shining out with positivity.

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May this modest piece of work contribute to greater dialogue and understanding among all people. While digital participatory platforms have their important role to play, the best technologies that humanity has ever had remain our heart and our mind. When the two work together, and (re-)connect with what is real, only interesting things can happen.

Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the Faculty Ethics Committee in October 2016.

I declare that the Word Count of this Thesis is 88,000 words.

Name:

Signature:

Date:

List of Main Abbreviations

AR	Augmented Reality
DPPs	Digital participatory platforms
3D Geoparticipation	Tools for 3-dimensional participatory mapping
2D Geoparticipation	Tools for 2-dimensional participatory mapping
IAP2	International Association for Public Participation
ICTs	Internet & communication technologies
PB	Participatory budgeting
PGIS	Participatory Geographic Information Systems
PP	Public participation
PPGIS	Public Participation Geographic Information System
VGI	Volunteered Geographic Information
SPP	Spectrum of Public Participation (IAP2, 2014)
UK	United Kingdom
USA	United States of America
VR	Virtual Reality

List of Terminologies

Citizens. The terms ‘community’, ‘public’ and ‘citizens’ and ‘residents’ are also used interchangeably. The term ‘community’ (as in ‘citizens’) must be disambiguated from association with the term ‘community development’, which can denote urban planning / town planning, or even social work. They are not investigated directly here, but are widely mentioned by planning professionals. As such, they appear as the ‘elephant in the thesis’, so to speak, and deserve dedicated enquiry in future research.

Digital participation. It is used interchangeably with online engagement and digital engagement to denote the type of participatory online activity that characterises DPPs

DPPs. The thesis employs the term digital participatory platforms (DPPs) as described by Falco and Kleinhans (2018b, p. 3):

> A specific type of civic technology explicitly built for participatory, engagement and collaboration purposes that allow for user generated content and include a range of functionalities (e.g. analytics, map-based and geo-located input, importing and exporting of data, ranking of ideas) which transcend and considerably differ from social media.

In effect, this term is used interchangeably with the bulk of other terms identified in the State-of-the-Art, such as ‘Civic Tech’, ‘ICTS for citizen participation’, or ‘online participatory technologies’ *(OPTs)*. It is recognised that Civic Tech can denote deliberative policy making, app-making events and various civic purposes that are not connected to urban planning or DPPs as defined here.

Elected officials. They are the politicians who lead local authorities and make decisions at city council boards. They sometimes partake actively in overseeing and fostering digital public participation in urban planning. The term is used interchangeably with ‘decision-makers’.

Local councils. Due to the international scope of the research, terms to denote city agencies with urban planning responsibilities are routinely referred to as the following: local councils, local authorities, municipalities, city agencies, and local government. The meaning here also denotes the city agencies which adopt and deploy DPPs.

Planning professionals. The term ‘planning professional’ is used to denote community engagement officers, communications officers, urban planners at local councils, urban planners at planning consultancies, urban designers, participatory budgeting officers, platform administrator *etc.* who happen to be the platform managers/administrators for a specific use case.

Public participation. Common terms to denote ‘public participation’ in the State-of-the-Art are used interchangeably throughout the findings. This is partly because planning professionals and software providers who participated in the research themselves use a wide range of terms to denote public

participation in urban planning processes. Therefore, the following main terms are used as synonyms: ‘community engagement’, ‘citizen participation’,’ public participation’, and ‘public engagement’.

Software providers. They are the companies or the staff at the companies that leverage DPPs to planning organisations. They are termed ‘providers’ because not all of the investigated companies literally develop their own software, but they are the ones who provide them to client organisations, typically via some form of procurement process.

1 Introduction

1.1 Background

This thesis investigates the use of *digital participatory platforms in urban planning*. Although a short title for such a mammoth piece of work, one should begin by unpicking its two main components: 1) *digital participatory platforms*; and 2) *urban planning*. Doing so will help make sense of what the thesis is about, and what lies beyond its scope. First, the context is 'urban planning'. Authoritative definitions of urban planning do not exist, as would be the case for the related terms 'spatial planning' and 'town planning'. Urban planning is perhaps best defined by its particulars, such as: transport planning, green infrastructure planning, economic planning, urban regeneration etc. The late renowned town planner Peter Hall himself stressed the difficulty of defining urban planning: "It refers to planning with a spatial, or geographical component, in which the general objective is to provide for a spatial structure of activities (or of land uses) which in some way is better than the pattern existing without planning" (Hall, 2011, p. 3). Some authors elude providing any definition altogether (e.g. Couch, 2016), and refer instead to descriptions of the profession provided by the Royal Town Planning Institute (RTPI) and the American Planning Association (APA).

Available definitions and descriptions of urban planning and town planning are typically flexible enough to cover the design, planning, management and evaluation of a wide range of urban activities and policies. Importantly, the definition of town planning in the *Founding Charter* of the European Council of Spatial Planners refers to public participation as an "indispensable element in the process" (ECTP-CEU, 1985, Annex A, cited in Couch, 2016, p. 7). The conception of urban planning in the present thesis also adopts the view that public participation should be part-and-parcel of the design, planning, management and evaluation of urban space and places. Like Couch (2016), I exclude concepts of rural planning, physical planning, regional planning which all denote a different focus of enquiry which is not explicitly urban in geographical scope. Urban planning can encompass transitional, temporary, peripheral and envisioned urban spaces (e.g. suburban development, placemaking or 'tactical' / 'pop-up' urbanist initiatives) (Duany, Plater-Zyberk, & Speck, 2001; Fredericks, Hespanhol, Parker, Zhou, & Tomitsch, 2018; Sawhney, de Klerk, & Malhotra, 2015). Urban planning can also include participatory budgeting, as a wide number of projects are spatial in nature and directly contribute to determine or reassign land use allocation in cities and shape the attractiveness and functionality of urban space and places (e.g. active mobility infrastructure, parks and recreation, public space creation, urban infrastructure upgrades). As Cabannes and Lipietz (2018, p. 68) report: "Most PBs [i.e. participatory budgeting schemes] are territorially based: they occur at the community, district, city or regional level and act primarily as "space-based" budgetary and management instruments". As a common form of shared decision-making about capital investment in

the built environment, participatory budgeting also contrasts with other forms of citizen participation that relate less explicitly or less directly to urban planning (e.g. neighbourhood assemblies, funding calls for running costs community group initiatives).

As regards digital participatory platforms (DPPs), Chapter 2 in this thesis reviews the diversity of conceptualisations and approaches to digital technologies for citizen participation in urban planning. I adopt the term and definition of DPPs used by Falco and Kleinhans (2018b, p. 3) as it best matches the aims of the thesis. They describe DPPs as:

> A specific type of civic technology explicitly built for participatory, engagement and collaboration purposes that allow for user generated content and include a range of functionalities (e.g. analytics, map-based and geo-located input, importing and exporting of data, ranking of ideas) which transcend and considerably differ from social media.

More generally, the recognition of the value of citizen knowledge in spatial planning practice mirrors the intellectual history of participatory planning theory (e.g. Falco, 2016; Lane, 2005). The literature highlights multiple, complementary rationales for a greater consideration of citizen views and knowledge in participatory urban planning. These include crowdsourcing, co-production, a recognition of citizens' multiple overlapping roles in society, and social learning (Albrechts, 2013; Brabham, 2009; Falco & Kleinhans, 2018b; Hayward, 2000; Hildreth, 2012; Ostrom, 1996; Rantanen & Kahila, 2009; Wildavsky, 2007 [1979]). Importantly, citizen participation is performative, contextual and reflects a diversity of publics and plentiful opportunities for conflict (Forester, 2006; Turnhout, Van Bommel, & Aarts, 2010). However, the conundrum of true consensus, which is a perennial ideal condition for and goal of public participation, is explicated by the necessary exclusionary element of public participation in practice. Due to finite resources in conducting public participation exercises and the inherent impossibility to engage *all* citizens and stakeholders in any planning process, some community voices will necessarily remain silent, underrepresented or even silenced by louder community voices (Connelly & Richardson, 2004, 2008). Post-political, neo-liberal and populist undercurrents, alongside entrenched tokenistic and consensus-framed approaches to public participation, all contribute to threaten if not annul opportunities for substantive public participation, notwithstanding recent waves in participatory governance innovations (Arnstein, 1969; Connelly & Richardson, 2004; Deas & Doyle, 2013; Flyvbjerg & Richardson, 2004; Fung, 2015; Rosol, 2015; Swyngedouw, 2005b, 2009).

Due to recent evolutions in Web 2.0 technologies, the last five years seem to have witnessed a significant increase in the adoption and use of Digital Participation Platforms (DPPs) in urban planning (Falco & Kleinhans, 2018b; Gün, Demir, & Pak, 2019; Hasler, Chenal, & Soutter, 2017). This growth in digital participatory technologies constitutes a substantial opportunity to increase the participation of previously 'silent' citizens, and improve the communication and dialogue between citizens and local government (Andrew Hudson-Smith, Crooks, Gibin, Milton, & Batty, 2009; Kahila

& Kyttä, 2009; Mukherjee, 2015; Warf, 2013). The emergence and penetration of Web 2.0 technologies in the public sector has enabled innovative participatory planning practices, coined 'Planning 2.0' (Anttiroiko, 2012b), within which DPPs are nested. While most digital tools within Planning 2.0 practices were previously used for communications purposes or limited interaction between cities and planning organisations (Desouza & Bhagwatwar, 2012; Ertiö, 2015; Evans-Cowley, 2010; Evans-Cowley & Hollander, 2010; Evans-Cowley & Manta Conroy, 2006), a growing number of DPPs now facilitate consultation and co-production (Falco & Kleinhans, 2018b; Gün et al., 2019; Hasler et al., 2017; Møller & Olafsson, 2018). At the core of digital participatory technologies is the aim of improving communication and dialogue between citizens and local government (Falco & Kleinhans, 2018a, 2018b). Active forms of public participation also presuppose that knowledge and values in spatial planning can be co-produced between lay citizens and expert professionals through a variety of participatory mechanisms (Nabatchi, 2012; Nabatchi & Leighninger, 2015). In the process, digital participatory technologies enable to bridge the gap between lay and professional knowledge so as to inform more inclusive and transparent spatial planning and decision-making processes (Kahila & Kyttä, 2009; Rantanen & Kahila, 2009). However, enduring barriers to digital participation in local government (e.g. digital divides) potentially constrain access to and limit civic appropriation of digital technologies by citizens (Bélanger & Carter, 2009; Cavallo, Lynch, & Scull, 2014; Clayton & Macdonald, 2013; Czepkiewicz, Jankowski, & Zwoliński, 2018; Zhao, Collier, & Deng, 2014). As a result, already hard-to-reach-groups risk further marginalisation from interaction with participatory planning through digital tools (Helsper & Reisdorf, 2016). Therefore, while digital technologies enable greater participation, they cannot replace traditional methods for public participation (Brown et al., 2014; Kahila-Tani, Kyttä, & Geertman, 2019; Stern, Gudes, & Svoray, 2009).

1.2 Knowledge gaps

In the context of the research background outlined above, it is clear that digital forms of public participation initiated by local government typically go beyond statutory requirements and provide evidence of a participatory turn in urban planning practice. Advantages over traditional methods include opportunities for mass participation, high quality citizen contributions, greater flexibility and accessibility of engagement opportunities, and simplified use of citizen input in planning (Afzalan & Muller, 2018; Falco & Kleinhans, 2018b; Kahila-Tani et al., 2019). However, current innovations are such that they outpace research about the use of digital engagement in participatory planning practices (Afzalan, 2015; Afzalan & Muller, 2018; Babelon, Ståhle, & Balfors, 2016; Hasler et al., 2017).

Research is therefore needed to gain a more holistic understanding of the use of DPPs within urban planning. In examining the literature, there appears to be a lack of empirical research about the objectives for public participation, as related to the diversity of technological, organisational and

institutional factors that guide the adoption and use of DPPs across a wide range of use-contexts in urban planning. The literature articulates a range of advantages, shortcomings, opportunities and challenges for the choice and use of DPPs, and the corresponding need for clear engagement strategies and transparent participatory processes (Afzalan, Sanchez, & Evans-Cowley, 2017; Falco & Kleinhans, 2018a; Leighninger, 2011; Nabatchi & Leighninger, 2015). However, few studies seem to collect empirical survey or interview attitudinal data from planning and community engagement practitioners or other supporting modes of enquiry (Afzalan, 2015; Boehner & DiSalvo, 2016; Escobar, 2014; Slotterback, 2011). Furthermore, there are difficulties in assessing the real influence of DPPs on planning decisions. These relate to multiple constraining factors: i) contrasting terminologies and understandings as to what constitutes effective public participation; ii) heterogeneous and unsystematic methods of evaluation; iii) a limited availability of comprehensive qualitative and quantitative data about participants and participatory processes, including the unwillingness to share experience when 'things don't work'; and iv) unsatisfactory intra-organisational incentives to produce robust evaluations for benchmarking and comparative purposes (Brown & Kyttä, 2014; Rowe & Frewer, 2005; Stempeck & Sifry, 2018).

Concerning technological features on DPPs, the literature lists typical ranges of functionalities (Afzalan & Muller, 2018; Falco & Kleinhans, 2018b; Gün et al., 2019). Few of these are empirical in nature, however. Regarding the arrays of participatory tools deployed in urban planning, studies customarily recognise the need to combine DPPs with other tools for public participation. However, they rarely illustrate how different participatory technologies are combined in specific locales (e.g. Nummi, 2018; Jiří Pánek, 2019; Parra, Rohaut, Maeckelbergh, Issarny, & Holston, 2017). No studies have been identified that explicitly investigate the complementarity between DPPs and other tools for public participation across a wide range of planning contexts and platform types. It is therefore clear from current literature that empirical academic knowledge about the use of digital participatory platforms in urban planning seems to lag behind recent technological and participatory planning innovations in practice (Afzalan & Muller, 2018; Babelon et al., 2016; Hasler et al., 2017). Furthermore, the field of digital participation seems under-theorised. The majority of digital participation studies embrace a range of approaches to participatory planning, such as communicative planning-inspired approaches, to develop models of digital participation that consider governance, data, and/or citizen-government relations in different ways. Despite a widespread recognition of interdependencies between the various socio-technical components of digital participation, the abundance and diversity of existing models and typologies hinder syntheses in the field. Therefore, actual knowledge about the use of DPPs in urban planning remains limited.

To help remedy this situation, there is a need for an overarching theorisation that fully takes stock of the hybridity and interdependencies between the main sets of socio-technical issues. Toward this end,

the thesis sets out to collect and analyse much needed empirical data about the range of socio-technical factors that affect the use of DPPs in urban planning. The thesis undertakes a qualitative meso-level investigation of 61 use-cases that concern 25 identified DPPs used in cities across Europe, North America and Australia. It builds on online survey and interview data collected from 83 planning professionals hired at planning organisations, which are complemented by interview data from 13 software providers. The research design structured all data collection methods to investigate 5 key dimensions of DPP use in urban planning:

i. the objectives for public participation mobilised in practice
ii. evaluation of DPPs' real influence on planning decisions
iii. the range of DPP functionalities which are perceived as most useful by practitioners
iv. the manner in which DPPs complement other tools for public participation
v. the main technical, organisational and institutional factors that determine the adoption and use of DPPs

1.3 Research aim and questions

Based on the problems that have been laid out, the primary aim of the research is to investigate the use of digital participatory platforms (DPPs) in urban planning. In particular, the aim to investigate and interlink the key identified socio-technical dimensions that seem to affect the use of DPPs. To deliver this aim, the research is framed around five aforementioned areas of investigation. These translate as the following five research questions:

RQ1. Which objectives for public participation do DPPs enable?

RQ2. Which levels of influence on urban planning decisions do DPPs enable?

RQ3. Which technological features on DPPs are perceived as most useful?

RQ4. How do DPPs complement other tools for public participation?

RQ5. Which main organisational and institutional factors affect the adoption and use of DPPs in urban planning?

On the basis of the above research questions, the thesis exploits the observed interdependencies between these five key areas of investigation. Recognising the thematic hybridity between the various socio-technical factors investigated, the thesis proposes an elaborate theoretical development that accounts for and utilises the thematic interdependencies. This endeavour is articulated as follows:

RQ6. How can the use of DPPs be theorised to better reflect their hybrid use in urban planning?

The overall contribution of the thesis is therefore both empirical (i.e. concerning RQs 1 to 5) and theoretical (RQ 6). Toward this end, the thesis adopts a qualitative meso-investigation and selection of use-cases that locates itself between a small range of in-depth case studies and a large-scale, statistically significant quantitative investigation of use-cases. Such a meso-level investigation is unique for the topic at hand, as most studies focus on a small range of use-cases and/or DPP types. In that respect, the contribution to knowledge is both empirical and methodological.

1.4 Thesis structure

Following this introduction, **Chapter 2** reviews the theoretical concepts and main approaches to public participation and DPPs in urban planning. The chapter also reviews the location of digital participation within the existing landscape of in-person and digital tools for public participation in urban planning. To further the understanding of DPPs within urban planning processes, **Chapter 3** examines the main organisational and institutional factors that influence the use of DPPs in urban planning. **Chapter 4** articulates the research design for the thesis. The chapter presents the adopted qualitative meso-level investigation that utilises semi-structured online surveys and interviews. The latter is chosen as the most appropriate approach to maximise the potential of empirical data from hard-to-reach planning professionals across a wide range of use-cases. **Chapter 5** introduces the Results by way of a categorisation of DPP platforms and an overview of the investigated platforms and use-cases. **Chapters 6 to 8** presents the findings from the data collection. Chapters 6 and 7 focus on the views of planning professionals, while Chapter 8 presents the views of software providers. **Chapter 9** summarises all the main findings in one location. The Discussion in **Chapter 10** merges the key findings from the planning professionals and software providers with the reviewed literature to provide practical insight about how to better take stock of and integrate DPPs' socio-technical hybridity in urban planning research and practice. The chapter highlights the key thematic interdependencies identified in the findings and the literature. By way of illustration of the socio-technical hybridity of DPPs, the chapter also provide an exploratory life cycle of DPP use in urban planning. Chapter 10 closes with recommendations for planning professionals and software providers to make synergetic use of the various socio-technical components discussed in the thesis. In **Chapter 11,** the key contributions to knowledge from the research are stated and conclusions are drawn. These include cues for future research.

2 Public participation: approaches, models & tools

This section discusses some of the most common approaches to public participation and its role in urban planning.

2.1 Introduction

This chapter begins by locating public participation within urban planning, particularly the four main intellectual and practice-based strands that have shaped contemporary practices in public participation. The State-of-the-Art proceeds with a concise overview of 20 influential models of public participation that have guided research about and/or the conduct of public participation. Six of these models are presented here, and the rest are presented as Appendix. The 20 models are categorised based on their use-value and main focus of enquiry. On the basis of the latter, 14 salient models of digital participation are presented alongside a range of common terminologies used to describe DPPs. DPPs are then located with a wider landscape of public participation tools and methods, as well as common and emerging digital technologies used in municipalities. By reviewing the diversity of approaches, ontologies and models of public participation and digital participatory technologies, the chapter provides a sense of the main objectives and complementary tools that guide the use of DPPs in urban planning.

2.2 Approaches to public participation

This section discusses some of the most common approaches to public participation and its role in urban planning.

2.2.1 Advocacy and equity planning

Much influential advocacy planning emerged in the United States in the late 1960s and 1970s to encourage planners to engage more politically in their profession by explicitly addressing structural socio-economic inequalities and defending the opinions of less powerful and disadvantaged groups in society. By advocating for greater inclusion, advocacy planning recognizes the diversity of publics and the necessity of pluralism in plan-making. As such, a pluralist approach to planning should aim to produce and acknowledge multiple planning alternatives with a view to address the wide range of issues that matter to different communities. In turn, this requires professional skills and an ability to coordinate multiple planning interests (Davidoff, 1965). A pluralist, inclusive approach to planning constituted a historical call to depart from the common technocratic, top-down unitary planning

approach that characterized much modernist planning of the day (Freestone, 2000; Lane, 2005).[1] Through its strong focus on inclusion and fostering of diversity, advocacy planning seems to overlap strongly with equity planning. Equity planning aims to redistribute resources to the poorest communities and makes them the first and foremost priority of planning, in effect providing more choices to those with the fewest choices. Equity planning champions include Norman Krumholz, whose pioneering work in Cleveland in the 1970s harboured a culture change among a whole generation of planning graduates if not also practitioners. However, it was arguably unable to appropriately address rampant urban decay and transform structural socio-economic challenges in the city (Kaufman, 1982; Krumholz, 1982).

The notion of equity is strongly anchored in the principle of redistributive justice. In practice, however, an equitable redistribution of resources proves harder than it may sound. For example, in a context of urban resilience and planning for green infrastructure, different understandings and approaches to resilience will likely generate different impacts in terms of equity. The different equity dimension of urban interventions must be carefully determined by considering five key dimensions: i) "who" (e.g. beneficiaries, service providers, decision-makers), ii) "what" (type of urban interventions), iii) "when" (long-term vs. short-term interventions), iv) "where" (the geographical distribution of urban interventions), and v) "why" (what is the purpose and focus of the urban interventions in terms of processes and outcomes) (Meerow & Newell, 2016). Beyond any laudable motivation to redress structural inequalities by addressing the specific needs of different communities, neither advocacy nor equity planning per se guarantee mechanisms for the public participation of the alleged beneficiaries. Elements of advocacy, equity planning and redistributive justice are often mentioned in relation to the pioneering participatory budgeting initiatives in Brazil in the 1990s, although their democratic innovative component seems to have been eroded over time (Cabannes & Lipietz, 2018; Montambeault, 2019).

2.2.2 Communicative planning

Communicative planning theory has its theoretical grounding in Habermas' theory of public dialogue and mutual learning as a key to achieving consensus on complex planning or policy issues. Habermas' communicative theory rests on an "ideal speech situation", motivated solely by reason unpolluted by selfish, divergent political motives or personal interests (Bond, 2011; Fischer & Forester, 1993; Tewdwr-Jones & Allmendinger, 1998). At its core, communicative planning is rooted in the belief that individuals can engage in fair, rational dialogue to reach consensual agreements. Through

[1] For example, various, contrasting strands of blueprint-based modernist planning emanated from the work of influential planners and architects such as Le Corbusier, Ebenezer Howard, and Robert Moses.

extensive and respectful dialogue, positions and points of view are shared in a way that establishes mutual understanding and appreciation of difference and informs the formulation of objectives that serve the common good. Public debate, as such, can lead to the discussion and resolution of disputes and disagreements, when conducted along shared rules of dialogue and mutual learning. It entails a capacity to overcome personal differences and seek out a collective agreement or compromise based on reason, fairness, and an objective consideration of facts.

Notwithstanding significant challenges to forging mutual understanding and consensus across diverse stakeholders, particularly in terms of power distribution and conflicting interests, a communicative approach to planning bears the promise of staging off opposition to contentious development plans and policies, and making both planning processes and outcomes more legitimate (Healey, 1997; Innes & Booher, 2010). By being receptive to and genuinely engaging with the concerns of diverse stakeholders, planners can provide means of integrating or effectively addressing social, cultural, economic, and political tensions in the city, rather than brushing them aside (Albrechts, 2013). While some participatory planning arguments emphasise the need to anchor public engagement in consensus (Healey, 1997), other authors advocate problem-solving that builds on the formulation of common goals that transcend individual or group interests, rather than absolute consensus per se (Forester, 1982, 2006).

Place and context matter tremendously for effective communicative planning. Engaging dialogue is often argued to stem from a stronger consideration of local cultural and socio-economic contexts, and an appreciation for local knowledge, in contrast to top-down modernist blueprint forms of planning. In the same manner as Jane Jacobs argued for people-centred planning (2011 [1961]), participatory democracy should also be contextually embedded rather than standardised, since "every polity has its own particular configuration, and its own specific history and geography" (Healey, 2012, p. 35).

Far from ever definitive or granted, "coproduction, as a normative and ethical concept, is… an ideal to be aimed at rather than something that can be perfectly achieved" (Albrechts, 2013, 58). Similarly, "the idea of a people-centred democracy, with progressive rather than regressive tendencies built into it, will always be 'incomplete' and emergent. It is a direction to be struggled for…" (Healey, 2012, 35). In contradistinction to practices of 'tokenistic' public consultation (Arnstein, 1969) and depoliticised public debates (Swyngedouw, 2009, 2010, 2011), a 'coproductive' approach to planning stands as politically radical in promoting ethical issues of spatial justice and power distribution (Albrechts, 2013). It can thereby constitute a means of re-politicising the abundant soft or fuzzy governance spaces of postmodern governance networks, for example in contexts of territorial and institutional devolution (Haughton, Allmendinger, Counsell, & Vigar, 2010; Metzger, 2011).

2.2.3 Agonistic planning & Critical realism

Critical realism highlights the importance of actual power practices in planning, which stand at odds with much communicative planning theory and related discussions of public deliberation.

A general critique of communicative planning is its downplaying of 'real' power – power being played 'behind the scene', or 'offstage', beyond formal channels of democratic influence. From a critical realist perspective, communicative planning theory stemming from Habermas' dialogical theory, with the normative ideal speech situation as its crux, falls short of recognising the (more or less) democratic power dynamics at work in spatial planning processes (Flyvbjerg, 1996; Flyvbjerg & Richardson, 2004; Richardson, 2005). For critics such as Mouffe (1995, 1999), the pluralism of views and rationalities in modern democracies itself signals the impossibility of reaching consensus without exclusion, making any form of consensus a necessarily conflictual, and temporary one. She writes (1999, 756-7):

> The inherently conflictual aspect of pluralism, linked to the dimension of undecidability and the ineradicability of antagonism is precisely what the deliberative democracy model is at pains to erase… This is why an approach that reveals the impossibility of establishing a consensus without exclusion is of fundamental importance for democratic politics…

The conundrum of true consensus is also explicated by the necessary exclusionary element of public participation in practice. Due to finite resources in conducting public participation exercises and the inherent impossibility to engage *all* citizens and stakeholders in any planning process, some community voices will necessarily remain silent, underrepresented or even silenced by louder community voices (Connelly & Richardson, 2004, 2008).

Additionally, a compulsive focus on consensual urban politics and decision-making may signal a profound incapacity to address substantive environmental and sustainable development challenges, which go far beyond the status quo, for example concerning such contentious issues as climate change. The incapacity to consider pluralist views and problem formulations in planning, in turn, can annul difference and obfuscate the articulation of substantive alternatives to the status quo (Hajer & Versteeg, 2005; Swyngedouw, 2010, 2011).

Mouffe's agonistic model of democracy advocates the democratic confrontation of pluralistic views, rather than their transcendence through apolitical rationality and morality aiming at a consensual common good. Other critics have adopted alternative critical approaches to the value of deliberation in democratic societies, such as: a Machiavellian approach (Flyvbjerg, 2002), approaches concerned with spatial justice (cf. Dooling, 2009; Fainstein, 2010; Harvey, 2008); analyses of repressive or semi-coercive regimes (Alfasi, 2003; Yiftachel, 2002); and a Foucauldian-realist approach grounded in the notion of governmentality (Flyvbjerg & Richardson, 2004; Rosol, 2015; Tewdwr-Jones & Allmendinger, 1998; Yiftachel, 1998).

Allmendinger and Tewdwr-Jones (2010) warn against the 'imperialistic' and 'moralistic' nature of the communicative planning paradigm. A Habermasian conduct of public dialogue somehow reproduces the kind of structural bias which it seeks to resolve. An attempt to universalise the ideal speech rationality runs counter to multiculturalism: it prescribes a normative, consensual mean of deliberating as a means of achieving consensus among participants. The ideal speech situation advocated by Habermas thereby overlooks the diversity of modes of civic expression and political action that prevail in prevail in particular locales, including the potential for conflict. The 'tyranny' of consensus also invites the 'post-political' condition, or the de-politicisation of the political realm that excludes or 'evacuates' substantive alternatives to the status quo. In this context, innovative tools and methods for public participation themselves are perceived to support or even accentuate the post-political condition, as they frame the very parameters of what can (and cannot) be discussed publicly (Allmendinger & Haughton, 2012; Radil & Anderson, 2018; Rosol, 2015; Swyngedouw, 2009, 2011). The strive for consensus is thus seen as inherently problematic in democratic terms. In the words of Rancière (2010, p. 42 quote d in Swyngedouw): ''the essence of consensus lies in the annulment of dissensus, 'the end of politics'''.

From the perspective of Foucauldian governmentality, governance operates beyond the confines of the state, and extends into society as a whole, by the conscious or unconscious intermediary of webs of institutions, organisations and individual actors with a stake or agency in urban planning processes. Governmentality is part-and-parcel of Foucault's tripartite cosmology of power, which consists of (Rosol 2015 261):

> i) *sovereignty*, rule by a politically sovereign body over a territory and a population through such means as laws;
>
> ii) *discipline*, particularly individuals' self-discipline with regards to established (formal and informal) laws and cultural norms, symbolised by the all-gazing surveillance mechanism of the Panopticon;
>
> iii) *governmentality*, the "conducting of conduct" by "encouraging certain forms of conducting the self".

The practice of governing is not a set of practices associated with the state apparatus per say. Instead, "to govern… is to structure the possible field of action of others" (Foucault, 1982, 221 quoted in Rosol 2015, 261).

In all, the above critical claims made about the agonistic and framed nature of spatial planning highlight that "critiques [of communicative rationality] do not undermine collaborative planning, but merely ask to be addressed" (Allmendinger & Tewdwr-Jones, 2010, 20). A communicative and collaborative approach to planning that integrates these critical elements in a constructive way can be found in critical pragmatism.

2.2.4 Critical pragmatism

Reflexive planning that is anchored in a democratic ethos can draw on the strengths of both communicative and critical realist approaches, so as to help overcome the limitations of either approach (Bond, 2011). Toward this end, Forester (2013) advocates a reflexive, critical approach that builds on common interests rather than differences, and a willingness to engage with power dynamics at work in planning. A pragmatic approach to communicative action in planning differs from a purely critical-realist approach in that it focuses on possibilities rather than an accurate description of the workings of power in spatial planning. It also moves beyond idealist claims about pure consensus and dialogue, to make use of opportunities that can effect change in planning practice (Hoch, 2007). Communicative action can also be pragmatic in a critical way: by leveraging lower political transaction costs for disadvantaged groups in society, planners can take stock of and tap into existing power networks to help redress structural inequalities in plan-making and other planning interventions. Building on Friedmann's (1973) theory of transactive planning , Sager (2006, p. 246) writes:

> The logic of critical communicative planning – critical pragmatism – is to alter political transaction costs by going against manipulative tactics and other deliberate perversion of communication whenever it promotes the fairness of the plan.

Such a critical approach to communicative planning cannot function in a planning environment that banks on an overtly consensual approach (Sager, 2006). It should also be wary of the shortcomings of earlier historical attempts at equity and advocacy planning in planning contexts that were beset by structural urban inequalities as faced by influential practitioner Krumholz (1982) in the 1970s.

A critical pragmatic approach encourages researchers and practitioners to avoid the pitfalls of excessively focusing on procedures and processes and of critically assessing outcomes alone (and the associated risk of getting lost in abstraction). An exclusive focus on methods, tools, procedures and processes runs the risk of "getting lost in the weeds" of metrics, unitisations and other measurements of the effective conduct public participation. The ability to measure and assess public participation efforts is indeed vital as part of comprehensive and transparent feedbacks to the public about their participation in planning processes. At the same time, an excessive focus on measurement might fail to assess actual outcomes on planning decisions, which are by nature much more difficult to assess (Stempeck & Sifry, 2018).

Another potential contribution to a critical pragmatic approach is the joint reliance on deliberative and direct, action-based modes of participation. Typically, a deliberative stage would prefigure and feed into subsequent active participation, as two distinct stages in a participatory process, as inspired by John Dewey's work on cooperative enquiry (Hildreth, 2012). Such a combined approach needs to be mindful of the possible tensions between them: "Participatory theories emphasize democratic

transformation of individuals and institutions, while deliberative ones stress democratic legitimacy and justification." (Hildreth, 2012, p. 296). A well-crafted, synergetic staging of both deliberation and direct participation further enables to overcome the limitations of either approach taken on its own, i.e. "all talk and no action" in the case of deliberation, and "action without reflection" in the case of direct participation.

In participatory mapping practice among small groups of participants, for example, a critical pragmatic approach needs to face up to the possible tensions between a focus on problem-solving and a focus on problem exploration, whereby a problem exploration stage should ideally prefigure a problem-solving stage. Beginning with problem exploration enables to achieve relative consensus among participants as to what the problems might be. Once a situation has been translated as a set of problems to solve, the participatory process necessarily limits and constrains the range of available solutions (Ramsey, 2009). This is perhaps true of any public participation process. This said, online participatory mapping processes can leverage both problem-exploration and problem-solving simultaneously rather than sequentially, without limiting the range of options for participants (see Babelon et al., 2016).

Methodologically, critical pragmatism can require combining models or frameworks of public participation that focus more explicitly on design and implementation of participatory procedures and processes, with models that are more overtly critical and analytical in nature (see Davis & Andrew, 2018).

2.3 Objectives for public participation

2.3.1 Overview

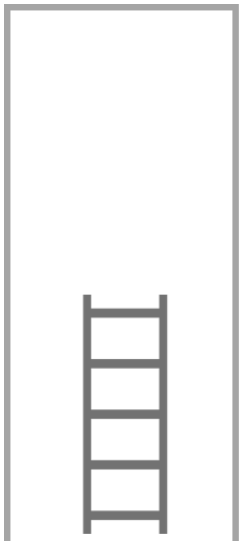
Public participation can serve a wide number of objectives in urban planning (Bryson, Quick, Slotterback, & Crosby, 2013). Figures 1-2 present an overview of a selection of 20 existing models and typologies for public participation and user involvement in spatial planning and public policy making. The selected models and typologies have been influential in planning practice and/or research. Out of these, six models are presented here:

1) Arnstein's (1969) Ladder of Participation
2) The Spectrum of Public Participation (SPP) by the International Association for Public Participation (IAP2) (IAP2, 2018)
3) The Modified Spectrum of Public Participation (Nabatchi, 2012)
4) The Staircase of Public Participation by the Swedish Association of Local Authorities and Regions' (SALAR – *Sveriges Kommuner och Landsting*) (SKL, 2013), which is also used in the research design for this thesis, and is largely modelled on the IAP2 Spectrum
5) The OECD's practical model for government-citizen relationships

6) The Planning for Real® approach to collaborative planning

Although Arnstein's Ladder of Participation is not used directly, it is presented here as it is arguably the single most influential model of public participation in urban planning internationally. It was also referred to repeatedly in the findings.

Figure 1- Overview of 20 models of public participation (here ladder- and staircase-based models)



FOCUS	NAME OF TYPOLOGY / MODEL	RANGE OF RUNGS / STEPS
	Ladder of citizen participation (Arnstein, 1969)	Manipulation → Citizen Control
	Ladder of empowerment (Rocha, 1997)	Atomistic individual empowerment → Political empowerment
	New ladder of citizen participation (Connor, 1988)	Education → Conflict resolution / prevention
	Public participation ladder (Wiedemann & Femers, 1993)	Public right to know → PP in risk assessment & recommendations of solutions
	Arnstein Gap (Bailey & Grossardt, 2010)	Observed gap b/w status quo & desired state (based on Arnstein's Ladder of Participation)
	Typology of public participation (Pretty, 1995)	Manipulative participation → Self-mobilisation
	Split ladder of public participation (Hurlbert & Gupta, 2015)	4 converging ladders based on problem complexity, collective learning and governance dimensions
	Ladder of public involvement (Dorcey et al., 1994)	Inform → Ongoing involvement (formulated as per planning stage)
	Staircase of Public Participation ('Delaktighetstrappan') (SALAR, 2013)	Inform → Shared decision-making
	Level of Participation (Wilcox, 1994)	Inform → Support community interests, alongside 9 other variables of public participation

Main focus of typology / model

Citizen control & empowerment | Conflict management | Information flow & communication mode | Social learning | Design & implementation

Figure 2 - Overview of 20 models of public participation - continued (here: spectra, discrete and other multi-dimensional models)

FOCUS	NAME OF TYPOLOGY / MODEL	RANGE OF RUNGS / STEPS
	Spectrum of Public Participation (IAP2, 2014)	Inform → Empower
	Modified Spectrum of Public Participation (Nabatchi, 2012)	As above, + 1 way → deliberative communication
	Stages of public involvement, with PP design matrix (Jackson, 2001)	Inform → Shared decision-making
	Typology of interests (White, 1996)	4 components : *form* (nominal → transformative); *top-down* (legitimation → empowerment); *bottom-up* (inclusion → empowerment); & *function*
	Public participation choices in policy (Bishop & Davis, 2002)	Consultation → Consumer control
	Social learning as policy paradigm (Collins & Ison, 2006)	Policy situations featuring levels of interdependencies, complexity, uncertainty and controversy
	Typology of public engagement (Rowe & Frewer, 2005)	Level of information flow b/w sponsors & public representatives: 1-way → 2-way
	Cube of Engagement (Fung, 2006)	3 axes: Participants' role; Power / Authority; Communication & decision mode
	Matrix of public participation (Schlossberg & Shufford, 2010)	Adaptable matrices: levels of participation, types of pp methods, and type of public
	Mosaic/scaffold of user involvement (Tritter & McCallum, 2006)	Suggested multiplicity of user involvement modes & forms of user-led evaluation

Main focus of typology / model

Citizen control & empowerment | Conflict management | Information flow & communication mode | Social learning | Design & implementation

A full presentation of the models illustrated in Figures 1-2 lies beyond the scope of the thesis. Instead, a description of each individual model is provided in Appendix I – Models of Public Participation. The overview reveals their diversity as an indication of the multifarious nature of public participation in spatial planning. A diversity of approaches is both a strength and a bane for the field of public participation. Diversity enables to adopt models of public participation that are fit for purpose or invite further testing in specific planning contexts. On the other hand, the rich landscape of terminologies and models presents a hurdle to comparisons of experiences and related generalisation of insight (Rowe & Frewer, 2005). As a result, the models can appear as either complementary or competing with one another.

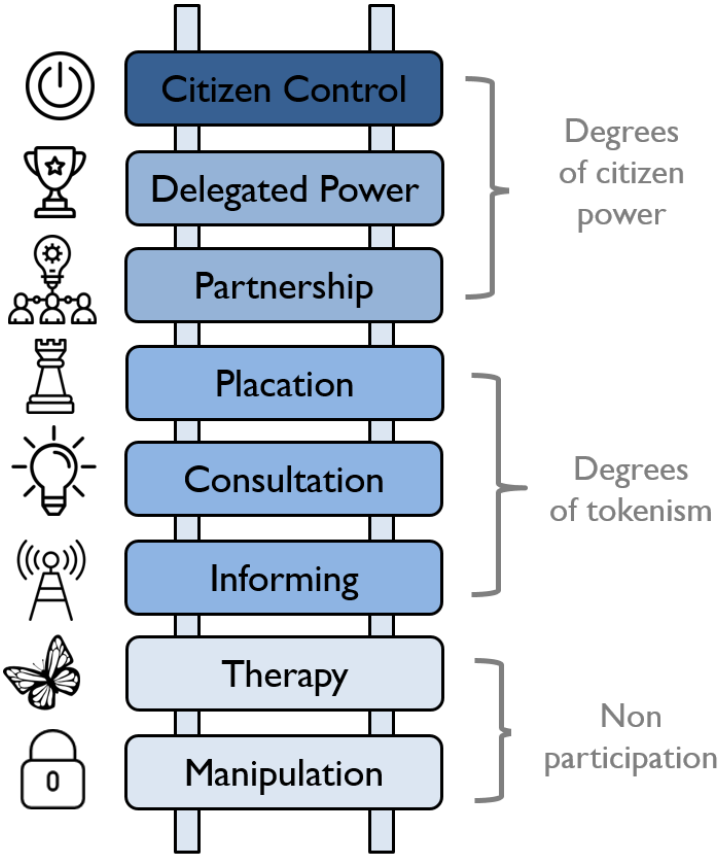
Nonetheless, the models can be classified according to their main focus. Figures 1-2 lay out the different models based on their structure: i) ladder or step-based; ii) spectrum-based; iii) discrete or non-incremental; and iv) matrix-based. Inspired by Arnstein (1969), there has been a flurry of ladder-based models. Some authors warn against the risk of relying on a single model and instead suggest a multiplicity of scales, for example in the form of a mosaic or scaffolding (Tritter & McCallum, 2006). Additionally, Figure 1 classifies the models based on their main focus, articulated around five main themes: i) citizen control and empowerment; ii) conflict management and prevention; iii) information flow and communication mode; iv) social learning; and v) design & implementation. A single model typically matches multiple categories, depending on its main use-value. The majority of models focus on citizen control and empowerment, and/or lend themselves for practical use in planning practice (i.e. design and implementation).

2.3.2 The Ladder of Participation

Arnstein's Ladder of Participation (1969) (Figure 3) is arguably one of the most influential typology of public participation and user involvement in research and practice (Slotterback & Lauria, 2019).[2] Designed as an advocacy and evaluation tool to better include the "have-nots" in public policy making processes (with specific reference to urban planning and urban renewal projects) (Gaber, 2019), the ladder consist of eight rungs that range from "manipulation" to "citizen control". Historically, it provided a preliminary step toward objectifying and critically assessing the real outcomes of public participation and help increase the accountability and transparency of planning processes.

[2] Citation counts for Arnstein's Ladder of Citizen Participation (1969) amounted to 5224 on the Scopus database and 15958 on Google Scholar (as of 12 April 2019). See also the 50 year anniversary issue of the publication of Sherry Arnstein's landmark paper in the Journal of the American Planning Association: https://www.tandfonline.com/toc/rjpa20/85/3?nav=tocList.

Figure 3 - Arnstein's Ladder of Participation (adapted from Arnstein 1969)



By design, it conveys "citizen control" as a moral, normative goal for public participation, which has been heavily critiqued in the literature (e.g. Collins & Ison, 2006; Connor, 1988; Davis & Andrew, 2018; Hurlbert & Gupta, 2015; Tritter & McCallum, 2006). It thereby fosters a model of direct democracy, which can conflict with representative models of democracy (P. Bishop & Davis, 2002). An unresolved ambiguity in Arnstein's approach resides in the confusion between "power" with formal "powers". Decisions themselves, viewed as decisive events, occur throughout a planning process (from scoping a problem and collecting and analysing information through to post-implementation) rather than at any single, definitive event. Power is not exerted only at the level of final decision-making, but also through consultation at all stages of policy-making and planning (Painter, 1992, cited in Lane 2005). Providing that consultation does in fact exert influence on the planning process, power can be effectively wielded informally as well as formally, without adopting a direct democracy model of participation.

Additionally, not all participation processes would benefit from direct democracy. For example, complex policy problems that require cross-evaluation of expert knowledge may not necessarily be suitable to approaches that set citizen control as a normative ideal. Classifying policy problems helps to identify whether and how the public should be engaged. John Clayton Thomas (1993, cited in P.

Bishop and Davis, 2002, p.18) identifies a range of decision-making approaches that can be paired with different types of policy problems. Decision-making can range from "autonomous managerial decision" where managers of public organisations choose not to consult openly with the public; to "public decision", where the public is actively involved to formulate and decide on solutions together with managers. Bishop and Glyn (2002) highlight the multiple effects of aligning public engagement with policy problem types, namely:

i. Public engagement becomes instrumental to solving policy problems rather than inherently value-laden
ii. It emphasises that it is public organisations, rather than the public, who usually initiates public engagement mechanisms for varying reasons
iii. Most importantly, it links up policy-problem with participation frameworks and technologies, enabling a more coherent model of public involvement
iv. If adopted strictly, the model of aligning policy problems with engagement frameworks also reduces the risk of managers manipulating engagement processes and outcomes

The ambivalent value of the Ladder of Participation concerns not only the Ladder itself (i.e. what it stands for) but also its historical role in planning thought and practice. Lane (2005) correlates the different rungs of the ladder with different planning models. He equates therapy and manipulation with blueprint styles of planning, associated for example with the work of Patrick Geddes and Ebenezer Howard. Informing, consultation and placation are associated with synoptic forms of planning. Finally, the upper rungs on the Ladder (partnership, delegated power and citizen control) are associated with pluralist forms of planning such as communicative, advocacy and transactive planning. Different planning models have conjured different roles for planners, as well as different modes of public engagement[3]. Of these planning models, communicative planning has probably been the most salient to the recent and contemporary literature on public engagement.

The Ladder also reifies stakeholder relations by pitching government organisations and citizens as somewhat homogenous as well as antagonistic groups, despite its author acknowledging that stakeholder groups are diverse in reality, with some community groups being more vocal than others, and civil servants and planning departments being more or less inclined to pursue participatory planning approaches. Because of its overtly critical perspective and relative reification of stakeholder perspectives, it remains mostly an analytical tool for advocacy purposes rather than a practical design tool.

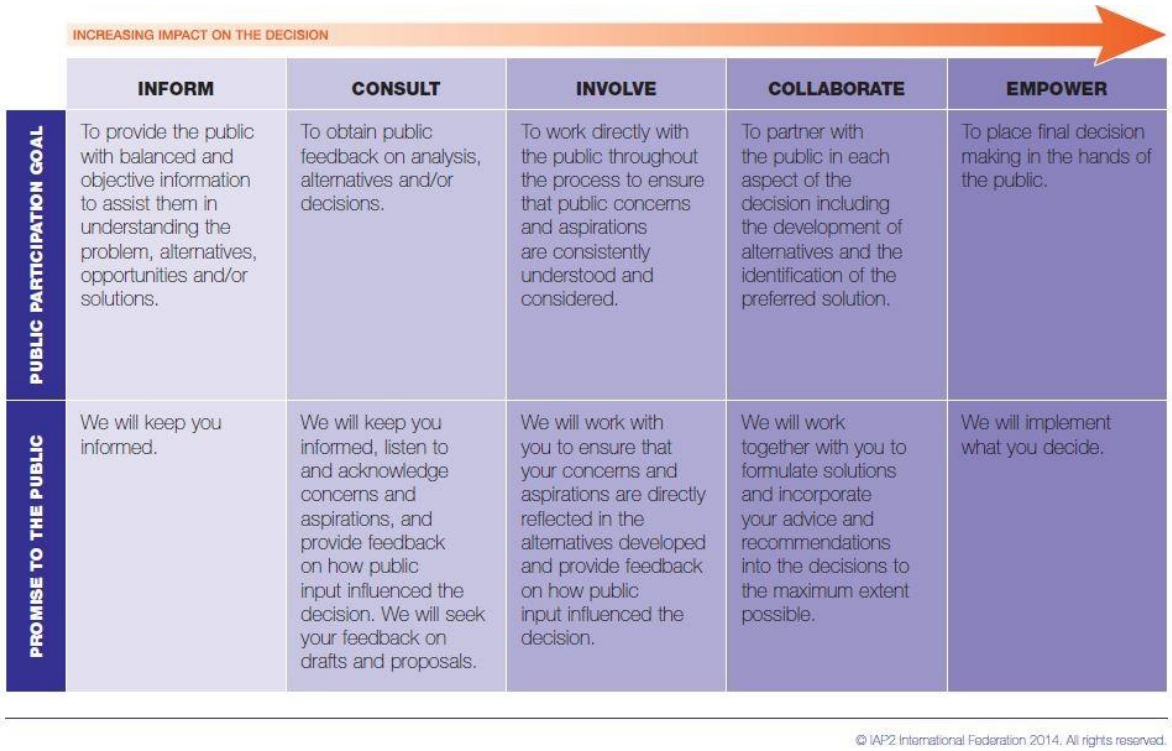
[3] A full discussion of the different historical planning models is beyond the scope of the thesis (see Lane, 2005)

It may be posited, however, that the Ladder's enduring popularity points to unresolved tensions and diverging interests between citizen and community aspirations and desires on the one hand, and the rationales and institutional procedures of government organisations as part of wider governance arrangements on the other. The ongoing debate about the post-political condition and the perceived depoliticisation of urban planning processes can be seen as exemplifying such unresolved tensions in the urban governance and local democracy literature. These tensions notably affect the scope for and value of community self-organisation and self-mobilisation in urban planning (cf. Allmendinger & Haughton, 2012; Beveridge & Koch, 2017; MacLeod, 2013; Radil & Anderson, 2018; Swyngedouw, 2011). Notwithstanding the apparent shortcomings of the Ladder, authors such as Gaber (2019) argue for more nuanced uses that take into account Arnstein's long-standing interest in critical pragmatic partnerships between planners and communities.

2.3.3 The IAP2's Spectrum of Public Participation (SPP)

After Arnstein's Ladder of Participation, the International Association of Public Participation (IAP2) Spectrum of Public Participation (SPP) is arguably one of the most well-known models of public participation, particularly among practitioners in Australia and the USA.

Figure 4 - The Spectrum of Public Participation (IAP2 2014), reproduced with permission



The Spectrum of Public Participation has come under criticism on several grounds. From a UK perspective, where 'public consultation' can denote a wide range of levels and methods of public participation, the low-ranking of the 'consultation' category can stand at odds with the complex reality of participatory planning practice. Jones (2017) unpicks the categories lying in the middle of the spectrum, in particular the 'Involve' category, which he argues refer to key characteristics of best practice consultation in a UK context. Portraying consultation as a low-hanging fruit and rather passive mode of engagement, he further argues, is out of sync with current practices and makes "the old-fashioned restrictive definition of consultation wholly obsolete". Instead, he suggests that quality consultation comprises three key dimensions: i) dialogue, ii) a genuine exchange founded on integrity, and iii) the objective of enabling participants to influence. Therefore, he advocates the following definition of consultation*: "The dynamic process of dialogue between individuals or groups, based upon a genuine exchange of views and, with the objective of influencing decisions, policies or programmes of action"*. By highlighting the objective to influence decisions, Jones also questions the IAP2's assumption that consultation is merely about obtaining feedback from the public, which implies retroactive participation, or engaging the public *after* decisions have been made, which in his view defeat the whole purpose of engaging the public in the first place.

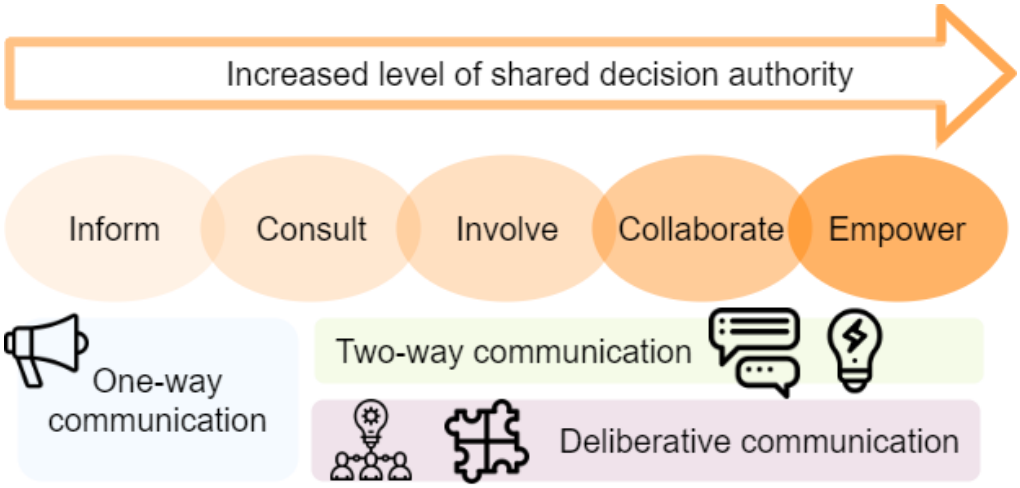
An additional criticism of the SPP relates to its poor critical analytical value. The Spectrum's strength lies in its focus on designing and implementing participatory procedures (Davis & Andrew, 2018), as it aims to "assist practitioners to assess the level of public impact appropriate to projects/initiatives" (IAP2, 2002, p. 34). In comparison to other models, such as Arnstein's Ladder of Participation, the SPP is not conducive to a critical evaluation of participatory processes (Davis & Andrew, 2018).

Several practitioners have also suggested dropping the 'Inform' category altogether from the spectrum, as they do not see it as constituting a form of public participation. Instead, they view it as an implicit preliminary step of any public participation process. More radical critics of the spectrum argue for a single objective for public participation proper, namely 'Collaboration', on the grounds that: direct empowerment is unfeasible if not illegal in most representative democratic decision-making contexts; involvement and collaboration practically refer to the same participation objectives; and that consultation as a post-hoc form participation is untenable as a form of genuine participation (see the different practioners' views expressed in Carson, 2008).

2.3.4 Modified Spectrum of Public Participation

In order to consider the production of public values more practically on the basis of the IAP2 Spectrum of Public Participation, Nabatchi (2012) augments the SPP to include communication modes, with one-way communication pertaining to the "inform" and "consult" categories, two-way communication to the categories from "consult" to "empower", and deliberative communication pertaining to "collaborate" and "empower" (Figure 5).

Figure 5 - Modified Spectrum of Public Participation (adapted from Nabatchi 2012)



Citing Gastil (2005), Nabatchi distinguishes two-way communication from deliberation as a communication mode.

> While there is variation, deliberation generally requires that a diverse group of participants take part in an open and accessible process of reasoned discussion in which they "reflect carefully on a matter, [weigh] the strengths and weaknesses of alternative solutions to a problem [and] aim to arrive at a decision or judgment based on not only facts and data but also values, emotions, and other less technical considerations" (Gastil 2005, 164).

Deliberation is typically more structured and conducive to problem-solving. It also features opportunities for equal expression, mutual respect and careful listening among participants. Two-way communication, on the other hand, runs the risk of slipping into one-way communication if inappropriately managed or designed. Techniques associated with deliberative communication include deliberative polling, town meetings and citizen juries. Techniques more strongly associated with two-way communication include citizen inquiries and public meetings. Nabatchi (2012, p. 702) posits that:

> Deliberative communication is more likely than two-way communication to assist public administrators in identifying and understanding the public values relevant to a given policy conflict. One-way communication is least likely to assist public administrators in identifying and understanding the public values relevant to a given policy conflict.

Overall, the modified spectrum aims to aid the design of effective participatory processes that seek to identify and take stock of the range of existing public values surrounding a particular context. Particularly, processes should leverage participation that: i) is interest-based rather than positions-based; ii) hinges on deliberative communication modes; iii) aims for higher levels of shared decision-making; iv) favours small group participation facilitated by professional engagement practitioners; v) provides adequate contextual information to participants; vi) includes a wide range of participants and minimises participation bias; vii) is iterative or features repeated opportunities for participation. Of

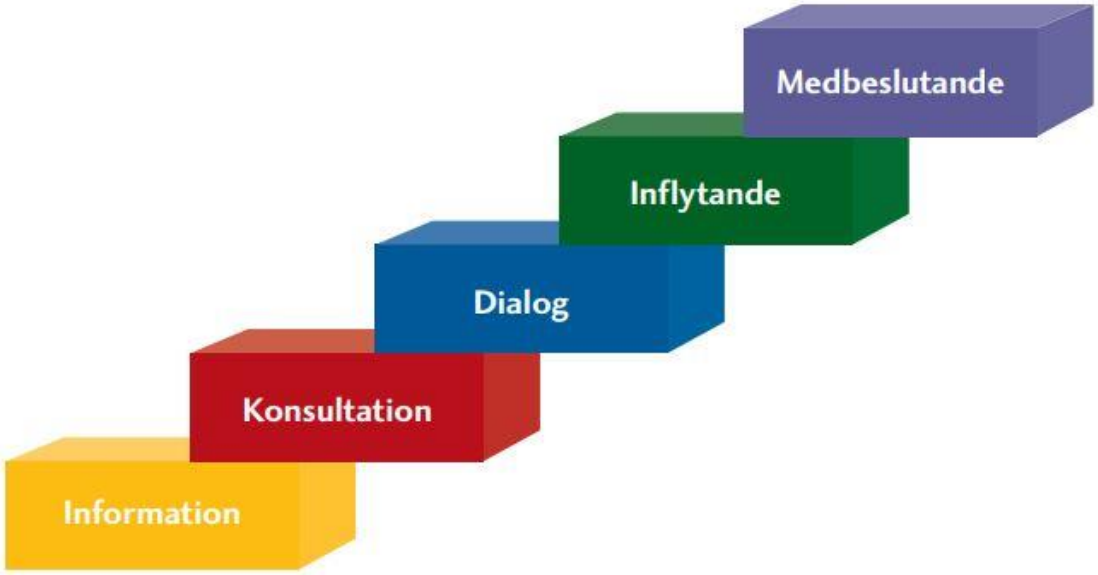
relevance to technologies that promote mass participation in spatial planning, Nabatchi (2012, p. 704) suggests that:

> ...large group format uses one-way or limited two-way communication and is more likely to promote adversarialism, whereas a small group format with integration processes is more likely to use deliberation and promote collaboration.

2.3.5 Staircase of Public Participation

The Staircase of Public Participation (SKL, 2013) was developed by the Swedish Association of Local Authorities and Regions as a local adaptation and operationalisation of Arnstein's Ladder of Participation and the IAP2 Spectrum of Public Participation (SPP) (Figure 6).

Figure 6 - The Staircase of Public Participation ['Delaktighetstrappan'] by the Swedish Association of Local Authorities and Regions (SALAR) [SKL] (2013, 18).



It differs only slightly in terminology, using terms that are more prevalent in the public involvement and spatial planning spheres in Sweden, translated literally as 'Dialog and 'Influence/Collaboration' and 'Shared decision-making'. The descriptions of the categories largely correlate with the corresponding categories in the Spectrum for Public Participation: 'Involve', 'Collaborate' and 'Empower', respectively. The terms for the "Influence/Collaboration" category can be translated more broadly as 'Participation' ('*Delaktighet*') or even perhaps 'Involvement', yet the description for the category denotes a strong or "deep" (Nabatchi & Leighninger, 2015) form of participation that correlates with 'Collaborate', more than it does with 'Involve' or 'Empower' on the SPP. The only notable difference between the Staircase and the SPP is the connotation that 'Dialog' involves effective two-way communication and perhaps less active involvement as that described in the SPP category 'Involve'. The views of citizens are to be considered and addressed throughout a planning

process, from beginning to end, yet how much this entails citizens' active involvement remains open to interpretation. Both the Staircase and the SPP remain open to interpretation, particularly as regards its middle categories[4]. Furthermore, 'Shared decision-making' ('*Medbeslutande'*) can appear as a misleading translation because it can refer to direct democratic tools such as referendums, which can be portrayed as resolutely empowering.

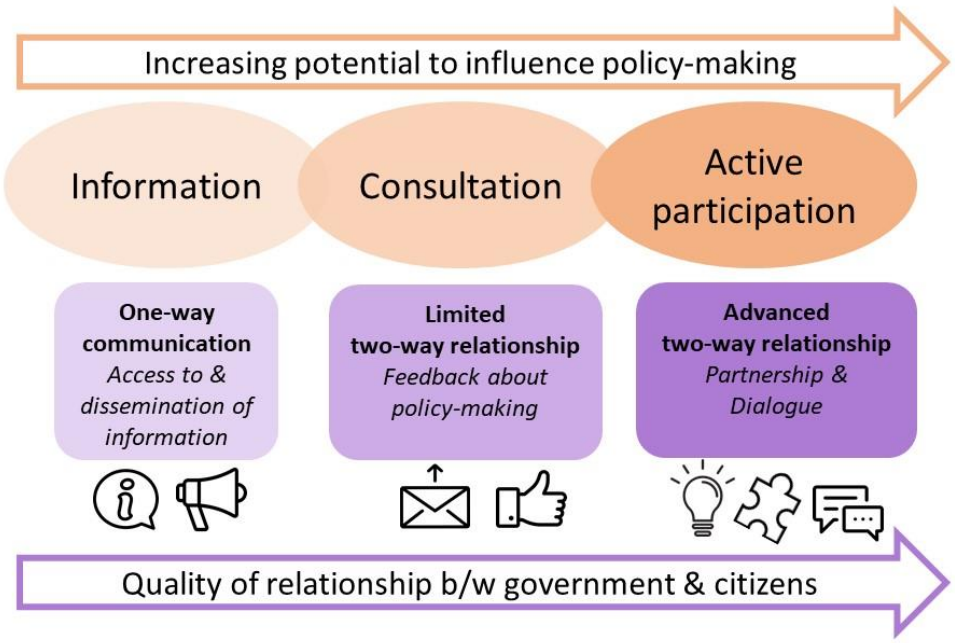
2.3.6 OECD

The OECD report *Citizens as Partners* (2001), authored by stakeholder engagement consultant Marc Gramberger, constitutes a landmark guidance document for engaging citizens in policy making. The report's real influence on participatory policy-making practice and theory is difficult to assess, however. Notwithstanding, the guidance document has been repeatedly cited in the literature, which provides at least some indication of its influence.[5] The report provides numerous concise tips and guidelines for effectively engaging citizens in policy-making, and, in-so-doing, "to give government officials practical assistance in strengthening the relations between government and citizens" (OECD, 2001, p. 8). Rather than seeking to provide an authoritative model of public participation, the approach identifies three main types of complementary government-citizen relationships (Figure 7). *Information* denotes a one-way communication flow from government to citizens, either as information dissemination, or as citizens' own initiative in retrieving government information. *Consultation* relates primarily to in collecting citizens' feedback on policy-making by way of limited two-way information flow. The process is largely top-down and directed by government agencies: "In order to receive feedback, government defines *whose views* are sought *on what issue* during policy-making" (2001, p. 16) [emphasis added]. *Active participation* denotes active citizen engagement in decision-making and policy-making, such as through proposing policy options. The responsibility for actual policy formulation and final decision-making rests with government, however. Active participation thereby functions as an advanced two-way relationship between citizens and government, but excludes forms of participation premised on direct democracy, citizen control (cf. Ladder of Participation) or shared decision-making per se (cf. Staircase of Public Participation).

[4] See the entry for the Spectrum of Public Participation in this section.

[5] 140 citations on Google Scholar [as of 20 February 2020]

Figure 7 - Practical model of government-citizen relationships, based on OECD (2001, p. 15-16) (Own graphic elaboration).

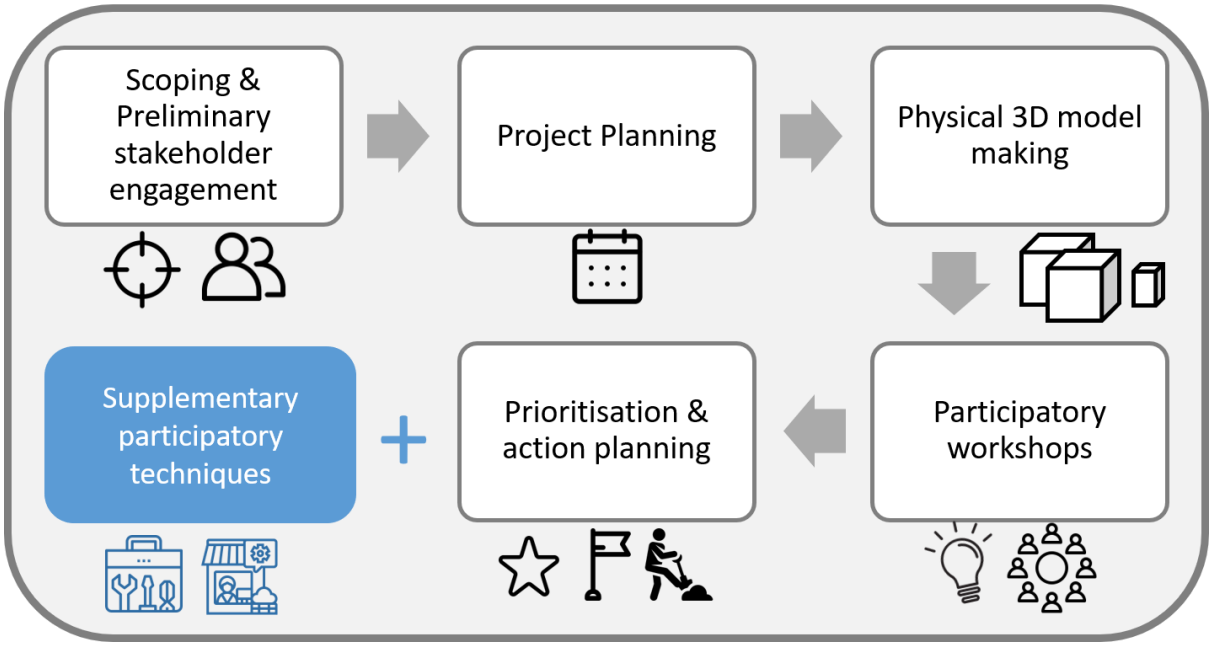


Benefits and incentives for strengthening government-citizen relations include: better public policy, greater trust in government, and a stronger overall democratic processes. These can enhance all stages of the policy life cycle, from problem identification to policy implementation and evaluation. Written in the very early days of the Web 2.0, the report also encourages the use of innovative ICT tools. The report's recommendations for the effective use of ICT tools for public participation remain valuable to this day. The threefold categorisation of public participation also makes it a simple, practical model for the design and evaluation of participatory planning processes at large.

2.3.7 Planning For Real®

Planning for Real® (PFR) deserves mention as an early and effective means of engaging local residents in spatial planning, particularly in a UK context. The participatory workshop approach was designed by Tony Gibson. It is based on the development and use of a 3D model for the expression of views, ideation and consensus-building in spatial planning (Gibson, 1991; PRF, 2018). It adopts multiple steps, from scoping and model-making to actual participatory events, followed by prioritisation and sorting of participants' input for action planning. As a physical/analogue precursor to digital forms of participation that embrace a spatial component, PFR caters for a wide range of participatory activities in a workshop setting. The Planning for Real methodology can be diagrammatically illustrated as follows (Figure 8).

Figure 8 - Planning for Real ® methodology (own graphic elaboration, based on Planning for Real, 2018)



Similar methodologies can be found in the UK and beyond, including: Participatory Rural Appraisal (Chambers, 1994), 3D Participatory GIS (PGIS) and Participatory 3D Modelling (P3DM) (McCall, 2003; Rambaldi & Callosa-Tarr, 2001) and early web-based applications of Public Participation Geographic Information Systems (PPGIS) (Kingston, Carver, Evans, & Turton, 2000). A similar, influential participatory workshop model in Sweden includes the URBAN STEP approach (Arken Arkitekter & Ekologigruppen AB, 2011), which adopts the 'Value Rose' (*värderosen*), a 12-spoked spider diagram that addresses complementary ecological, social, physical and economic sustainability dimensions to planning.

2.4 DPP ontologies & models

From the late 1990s onward, a flurry of digital participation frameworks have emerged that take stock of and can guide the development of a wide range of digital technologies for public participation. This section begins by considering the wide range of terminologies that describe different types of DPPs. It then provides fourteen frameworks for digital participation. These frameworks have largely borrowed from the public participation models presented above and in Appendix I (Models of Public Participation). Figures 9 and 10 provide an overview of the fourteen main models of digital engagement reviewed here.

Figure 9 - Models of digital engagement – Focus on Government relationships & Objectives for public participation (own elaboration)

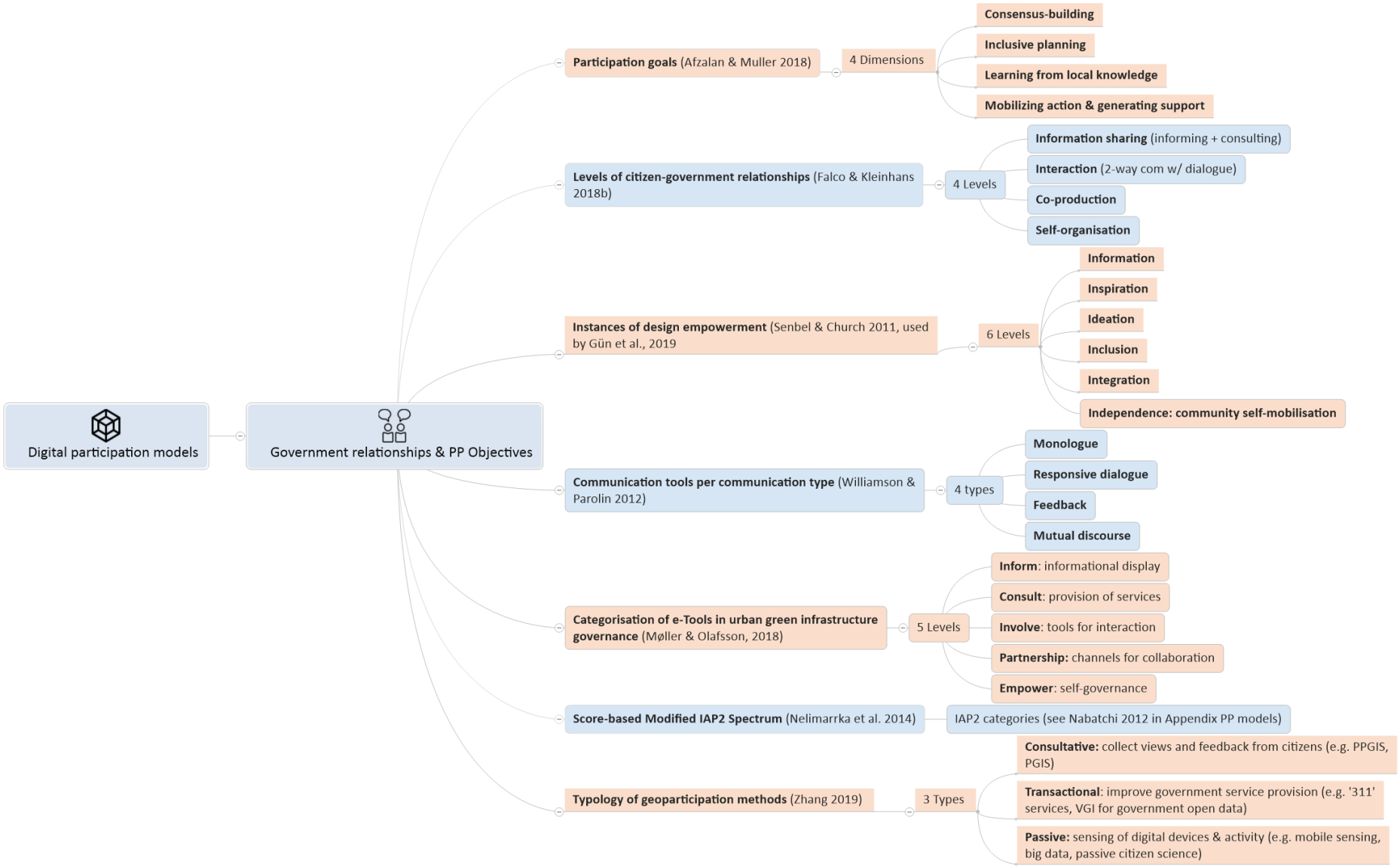
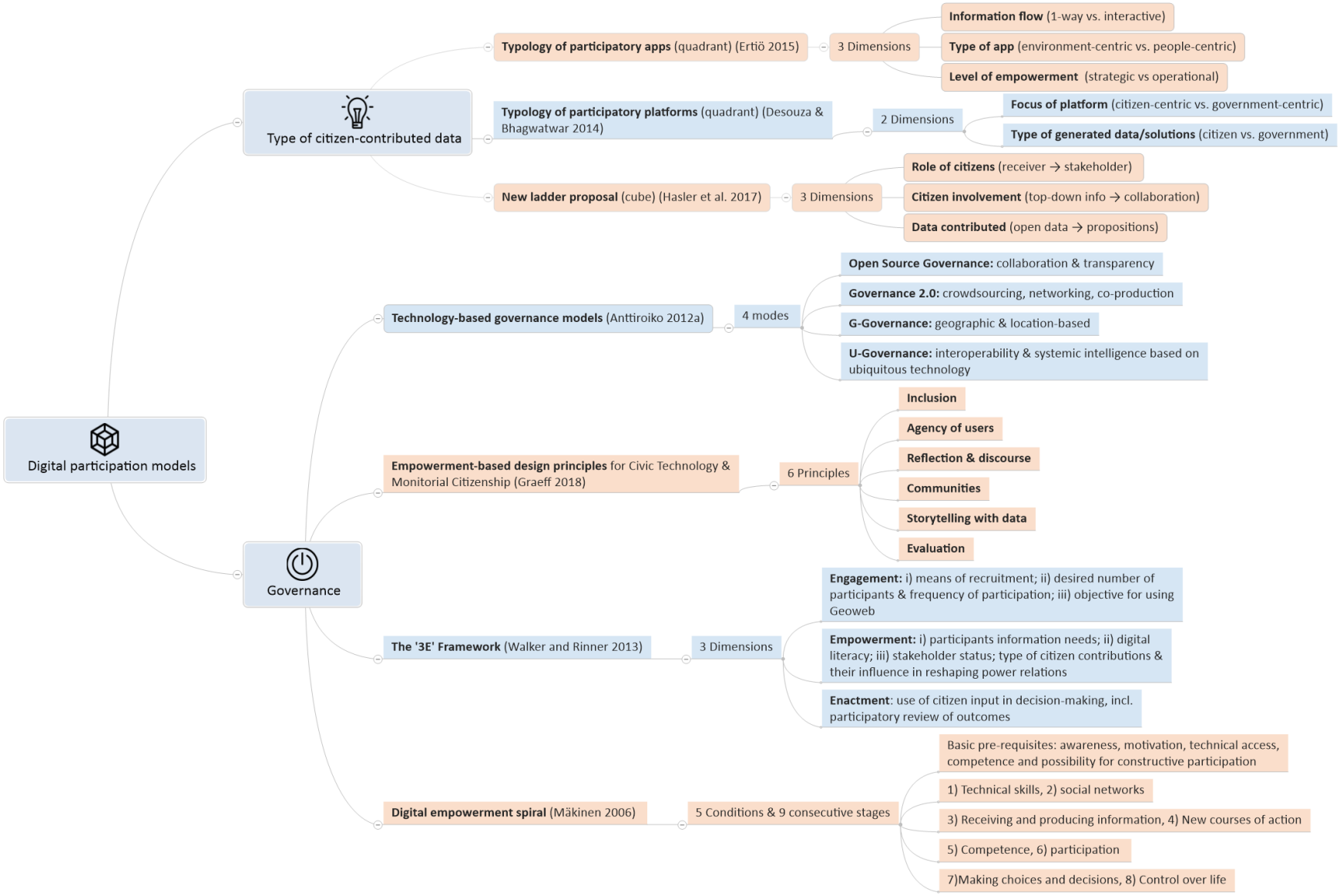


Figure 10 - Models of digital engagement – Focus on Design empowerment & Governance (own elaboration)

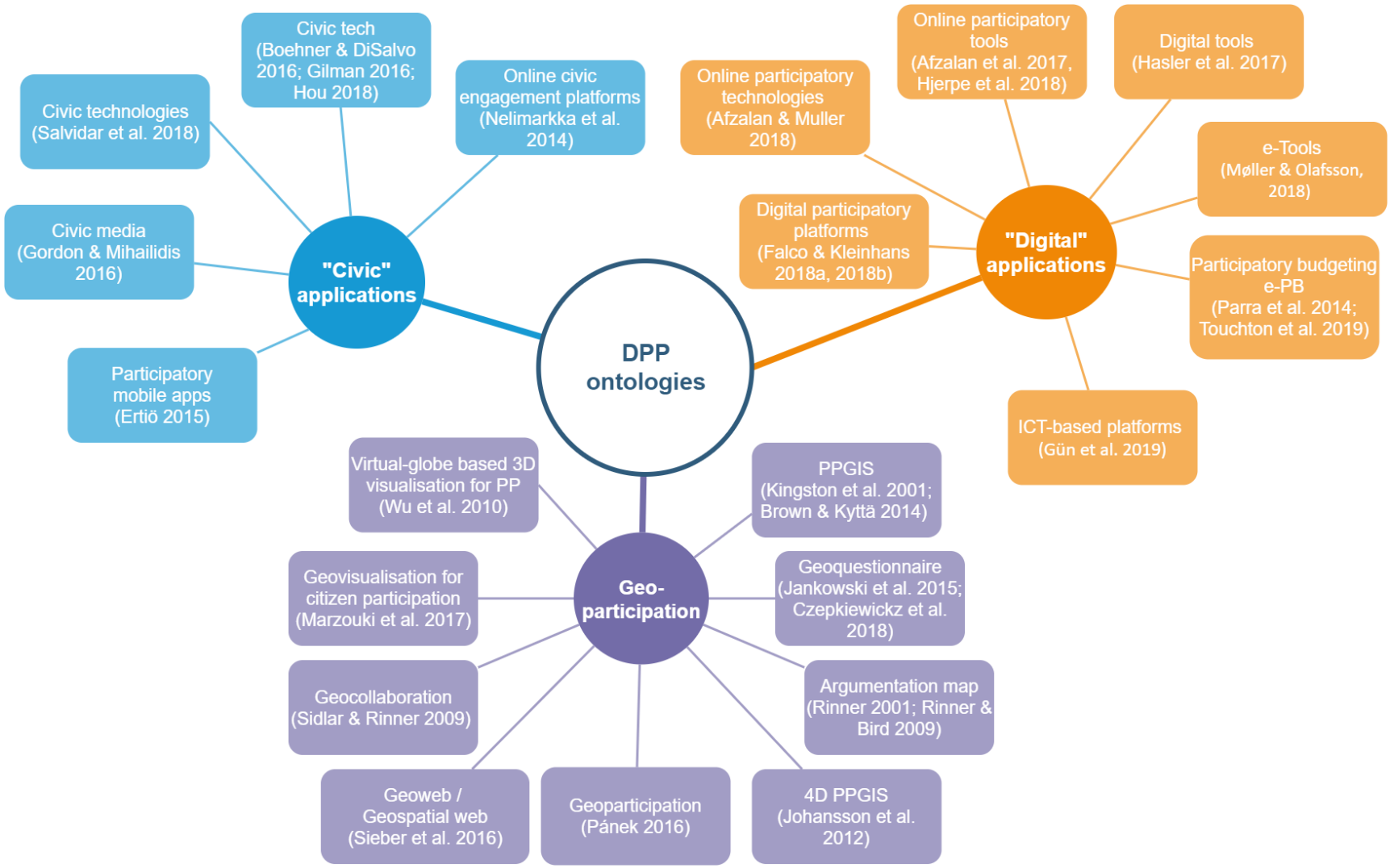


2.4.1 DPP ontologies

The development and adoption of online technologies in a variety of spatial planning contexts is largely outpacing academic research on the topic (Hasler et al., 2017; Saldivar, Parra, Alcaraz, Arteta, & Cernuzzi, 2018), leading to a significant knowledge gap concerning the key success factors affecting their deployment (Gün et al., 2019) The ontologies of online public participation in spatial planning are also somewhat slippery and fuzzy. Several terms have been mobilised to identify online platforms designed specifically to engage citizens in urban planning in different ways (Gün et al., 2019). Terms identified in the literature include: *digital participatory platforms* (Falco & Kleinhans, 2018b), *e-tools (Møller & Olafsson, 2018)*, *online participatory technologies* (Afzalan & Muller, 2018), *online participatory tools* (Afzalan et al., 2017; Hjerpe, Glaas, & Storbjörk, 2018), *digital tools* (Hasler et al., 2017), *ICT-based platforms* (Gün et al., 2019), *technology-enabled participatory platforms* (Desouza & Bhagwatwar, 2014), *civic technologies* (Saldivar et al., 2018), *civic tech* (Boehner & DiSalvo, 2016; Gilman, 2016; Hou, 2018), *civic media* (Gordon & Mihailidis, 2016), *civic apps* (Abeyta, 2014; Giest, Koene, Vallejos, Pitkänen, & Fosci, 2016) and *online civic engagement platforms* (Nelimarkka et al., 2014).

Although these generally refer to similar types of online technologies for public participation, the diversity of competing terms also reveals differences and can contribute to some confusion in the field. Common functionalities include: drawing 2D shapes, inserting 3D volumes, submitting ideas and proposals, deliberating, reporting of maintenance needs, mobile sensor-based contribution of data, commenting, voting, 'liking' or disliking ideas, ranking scenarios, interactive visualisation and navigation, text- and map-based surveys, sharing of content on social media and communication of various forms of information through multiple media (e.g. text, images, videos) (cf. Billger, Thuvander, & Wästberg, 2016; Desouza & Bhagwatwar, 2014; Falco & Kleinhans, 2018b; Gün et al., 2019; Hasler et al., 2017). See Figure 11 for an overview of the terminologies found in the literature.

Figure 11 - Ontologies of digital participatory platforms (DPPs) (own elaboration)



Platforms that are beyond the main focus of the PhD do feature on Figures 9-11. For example, in their comparison of citizen-led and government-led platforms, Afzalan and Muller (2018) discuss the use of the social media platform *Nextdoor*. Likewise, citizen-focused Participatory GIS is sometimes discussed alongside PPGIS initiated by local government (Brown, 2016; Brown & Kyttä, 2014, 2018; Haklay, Jankowski, & Zwoliński, 2018; Mukherjee, 2015; Zolkafli A., Brown G., & Liu Y., 2017).

The literature indicates that, although not identical, the terminologies seem to denote a broadly similar range of online technologies. For example, Hasler et al. (2017, p. 231) mobilise the term *digital tools* broadly to include "web-based platforms, mobile phone or tablet applications, as well as other types of technology-based devices used to collect data from citizens, such as sensors."

Desouza and Bhagwatwar (2014, p. 26) define technology-enabled participatory platforms as:

> Forums created to source, analyze, visualize, and share information, expertise, and solutions to advance social causes and/or solve social and policy problems. These platforms not only address some traditional concerns about civic engagement—such as lowering the barriers for citizens to engage—but have also promoted a wave of innovation around how citizens tackle local challenges and realize opportunities collectively.

Drawing on the definition provided by Desouza and Bhagwatwar (2014), Gün et al. (2019) indicate that citizens can use such 'opportunities' to their own benefit. Gün et al. (2019, p. 6) further describe the range of web-based participatory platforms as encompassing:

> computer-based online participatory environments such as digital participation portals, digital games developed for citizen participation, desktop-based application platforms [...] These kind of platforms are expected to have capabilities and tools such as 2D and 3D geovisualization capability, Web 2.0 collaboration tools and interactive sketch tools so that users can visualize, manipulate and discuss urban projects in collaborative environments (Poorazizi, Steiniger, & Hunter, 2015) [...] Thus, these platforms can change the future of urban design towards an agile, data and need-driven direction through which the urban issues can be addressed from the users' perspective in real-time.

Falco and Kleinhans (2018b, p. 3) provide one of the most comprehensive inventories of digital participatory platforms (DPPs) to date. They define DPPs as:

> A specific type of civic technology explicitly built for participatory, engagement and collaboration purposes that allow for user generated content and include a range of functionalities (e.g. analytics, map-based and geo-located input, importing and exporting of data, ranking of ideas) which transcend and considerably differ from social media.

Borrowing from Afzalan et al. (2017), Hjerpe et al. (2018, p. 160) describe online participatory tools (OPTs) in a rather open and inclusive manner:

> OPTs often utilize advancements in Public Participatory GIS, including geotagged questionnaires (Czepkiewicz, Jankowski & Mlodkowski, 2017; Jankowski, Czepkiewicz, Mlodkowski, & Zwolinski, 2016) and data visualization techniques used in Planning Support Systems (Russo, Lanzilotti, Costabile, & Pettit, 2018), to broaden the scope of participation by engaging more citizens in providing input on local planning (Afzalan et al., 2017).

Interestingly, not all studies provide explicit definitions of the ontologies they are investigating. For example, Nelimarkka et al. (2014) do not explicitly define or describe what they mean by 'online civic engagement platforms', yet they compare three platforms used in urban and regional planning of a similar kind as those encompassed by the other terminologies reviewed here. Based on their own review of the literature, Boehner and DiSalvo (2016) note that the term 'civic tech' can denote a surprisingly wide range of applications, including apps embedded in the so-called shared economy, such as AirBnB, which would not normally count as 'civic'. Notwithstanding, Boehner and DiSalvo (2016) also argue that the civic tech classification ought to encompass such broad fields as Urban Interaction Design, Urban Computing, ICT for development (ICT4D), Participatory Design, and other user-centred HCI design approaches that can yield various social, cultural, health, political and environmental benefits, all with an explicit civic component. However, the empirical findings in Boehner and DiSalvo (2016) focuses on the role of civic hackathons, which lies beyond the core focus of this thesis.

Overall, these comprehensive terminologies allow to include studies and reviews that focus more specifically on a narrower range of tools and technologies, such as: Public Participation GIS (PPGIS) (e.g. Brown & Kyttä, 2014; Ganapati, 2011; Kingston et al., 2000; Obermeyer, 1998; Schlossberg & Shuford, 2005), Participatory GIS (PGIS) (e.g. Corbett, Cochrane, & Gill, 2016; Dunn, 2007; Ghose, 2003; McCall, 2003; Zolkafli A. et al., 2017), mobile applications (e.g. Ertiö, 2015; Evans-Cowley & Kubinski, 2015), virtual reality (Bourdakis, 1997; Gordon & Koo, 2008; Oksman & Kulju, 2017) "serious games" or gamification applications (I. D. Bishop, 2011; Reinart & Poplin, 2014; Thiel, Reisinger, Röderer, & Baldauf, 2019), virtual cities (Bourdakis, 1997; S. Graham & Aurigi, 1997; Hjerpe et al., 2018) and various bespoke thematic platforms, such as online participatory budgeting portals (e.g. Zafeiropoulou, Carlsson, & Andersson, 2015). Besides the earlier studies cited above, the current body of literature also builds on other foundational work on innovative digital technologies conducted in the late 1990s and the 2000s which have largely contributing to shaping the field (e.g. Al-Kodmany, 1999, 2001a; Cinderby, 2010; Evans-Cowley & Hollander, 2010; Evans-Cowley & Manta Conroy, 2006; S. Graham & Aurigi, 1997; Haklay & Tobón, 2003; Andy Hudson-Smith, Evans, Batty, & Batty, 2002; MacEachren & Kraak, 2001; Rinner, 2001; Tulloch, 2007; Twitchen & Adams, 2012; Williamson & Parolin, 2012).

Terminologies usually exclude social media platforms (e.g. Facebook, Twitter, Instagram). This is probably due to the fact that a substantial body of literature already focuses exclusively on and interrogates the participatory nature of social media use in spatial planning (e.g. Afzalan & Evans-Cowley, 2015; Evans-Cowley, 2010; Falco & Kleinhans, 2018c; Kleinhans, Van Ham, & Evans-Cowley, 2015; Williamson & Parolin, 2013a). However, Falco and Kleinhans (2018a, p. 18) argue that "DPPs are a specific kind of social media". The challenges that affect social media use also affect

digital participatory platforms. For example, social media and DPPs often share similar between-user interactive functionalities such as commenting, "liking" and so on, and users can often share comments and other inputs on other social media (Falco & Kleinhans, 2018b).

The investigated technologies mediate different levels of participant *interaction* through their functionalities,[6] as opposed to more passive modes of engagement such as informational websites, or less interactive tools such as standard online text-based survey tools. Several authors view participatory online technologies as mediators of *knowledge*, rather than simply data or information (e.g. Møller & Olafsson, 2018; Rantanen & Kahila, 2009) Some reviews however do include a significant number of technologies that enable only one-way communication and reporting, only simplify access to local government services, or focus mostly on the use of open data (Desouza & Bhagwatwar, 2012, 2014; Falco & Kleinhans, 2018b). Distinctions also apply depending on the nature of planning projects. Falco and Kleinhans (2018b) distinguish between shorter-term and smaller scale projects (e.g. urban infrastructure or development projects that are temporally and spatially bound) and longer-term projects which are more future-oriented and stretch over both time and space (e.g. municipal and metropolitan plans).

The literature typically investigates the range of online participatory technologies as tools or methods (i.e. *means*) rather than as actual goals for public participation (i.e. *ends*). Møller and Olafsson (2018, p. 3) write: "E-tools are not governance solutions in themselves but are to be perceived as tools to facilitate more or less participatory and collaborative governance". While the crowdsourcing and participatory potential of online technologies is widely recognised, their actual effect on planning is far from straight forward because reliant on a multiplicity of factors, which contributes to the difficulty in evaluating and isolating the influence of online technologies, in turn leading to the under-evaluation of online participatory processes[7] (Hasler et al., 2017; Stempeck & Sifry, 2018). The mobilisation of Civic Tech and various digital participatory technologies as part of smart city development strategies can also reveal tensions between technology- and capital-centric development on the one hand, and inclusive, citizen-centric participation on the other. Where smart cities are technology-driven at the expense of social inclusion, the use of innovative participatory digital technologies can work against the inclusion of diverse views in smart city planning (cf. Alverti, Hadjimitsis, Kyriakidis, & Serraos, 2016; André, 2015; Battarra, Gargiulo, Pappalardo, Boiano, &

[6] Here, the term "mediate" is used to denote functional, technology-mediated interaction, grounded in a user-centred approach to Human Computer Interaction (HCI) (e.g. Kaptelinin & Nardi, 2012), as opposed to the conflict management connotation of the word mediation that is also commonly mobilised in the urban planning literature dealing with public participation (e.g. Forester, 2012).

[7] See also the earlier parts of the literature review that deals with public participation models.

Oliva, 2016; Castelnovo, Misuraca, & Savoldelli, 2016; Gagliardi et al., 2017; Albert Meijer & Bolívar, 2016). Therefore, technology is not perceived as a silver bullet to effective public participation in spatial planning.

Several studies distinguish between *participant-led platforms* (i.e. used for community self-organisation and various community-led activities that are not necessarily related to urban planning) and *planner-led platforms* (i.e. bespoke websites and applications managed by various planning organisations to engage citizens in urban planning) (e.g. Afzalan & Muller, 2018; Falco & Kleinhans, 2018b; Møller & Olafsson, 2018). The above distinction in purpose is echoed in the literature on online participatory mapping technologies, most notably regarding the soft (rather than hard) distinctions between Participatory GIS (PGIS) and Public Participation (PPGIS). PGIS tends to be conceived as community-initiated or community-centred forms of participatory mapping and GIS (e.g. in the form of community maps) that are not necessarily associated with formal planning organisations such as city agencies and urban planning consultancies Public Participation GIS, on the other hand, is typically initiated and managed by local government or other planning organisations (cf. Atzmanstorfer, Resl, Eitzinger, & Izurieta, 2014; Brown & Kyttä, 2014; Kahila-Tani, 2015; Sieber, Robinson, Johnson, & Corbett, 2016). A similar distinction can emerge between community-centred and organisation-centred applications, which leverage different levels of collaboration and participation (Møller & Olafsson, 2018). For instance, online or mobile applications that enable community self-organisation are sometimes portrayed as more empowering than government-initiated applications (Møller & Olafsson, 2018), while other analysts contend that community-initiated participatory projects are not necessarily empowering because not easily integrated in urban political decision-making processes (Radil & Anderson, 2018).

Geoparticipation also denotes multiple terminologies. These include: geoparticipation itself (Jiří Pánek, 2016; Zhang, 2019), Public Participation GIS (Brown & Kyttä, 2014; Kingston et al., 2000), 4D PPGIS (Johansson, Hartmann, Jongeling, & Olofsson, 2012) geo-questionnaire (Czepkiewicz et al., 2018; Jankowski, Czepkiewicz, Młodkowski, & Zwoliński, 2015), argumentation maps (Rinner, 2001; Rinner & Bird, 2009), participation on the geoweb/geospatial web (Sieber et al., 2016; Walker & Rinner, 2013), geocollaboration (Sidlar & Rinner, 2009), geovisualistion for citizen participation (Marzouki, Lafrance, Daniel, & Mellouli, 2017), and virtual globe-based 3D visualisation for public participation (H. Wu, He, & Gong, 2010). The map-based component unites all forms of geoparticipation, which is utilised in varying degrees of intensity across applications and for a wide range of planning purposes, including: *parking siting* (Meng & Malczewski, 2010), *urban infill* (Babelon et al., 2016; Czepkiewicz et al., 2018; Hjerpe et al., 2018), *relocation of city centres* (Johansson et al., 2012), *masterplans* (Kahila-Tani, Broberg, Kyttä, & Tyger, 2016), *active mobility* (Griffin & Jiao, 2019), *green infrastructure planning* (Laatikainen, Tenkanen, Kyttä, & Toivonen,

2015; Rall, Hansen, & Pauleit, 2018; Raymond, Gottwald, Kuoppa, & Kyttä, 2016), *mapping of ecosystem services* (Brown & Fagerholm, 2015; Ridding et al., 2018), *land use preferences* (Brown & Raymond, 2014), *campus planning* (Blachowski, Łuczak, & Zagrodnik, 2018; Rinner, Keßler, & Andrulis, 2008), *culture heritage planning* (Nummi, 2018), *architecture competitions* (Eräranta, Kahila-Tani, & Nummi-Sund, 2015) and *urban well-being related to environmental qualities* (Fagerholm et al., 2016; Kyttä, Broberg, Tzoulas, & Snabb, 2013).

In navigating the abundance of terminologies that related to digital platforms for public participation, one should also mind differences between Civic Tech and GovTech, two popular buzzwords that are commonly used to denote a wide array of technologies used by local government to engage the public. Co-founder of the influential Civic Tech start up CitizenLab, van Ransbeeck (2019) distinguishes between Civic Tech and GovTech as focusing on citizens and government, respectively. While Civic Tech primarily aims to engage and overcome barriers to participation in society, the aim of GovTech is to improve process efficiency in government processes, with corresponding challenges in terms of slowness of adoption of innovative technologies and collaborative workflows. The distinction may be analytical more than absolute, as digital applications have the potential to leverage both types of digital solutions through increased interoperability (Anttiroiko, 2012a, 2012b; Hjerpe et al., 2018; Sieber et al., 2016).

PlanTech and Planning 2.0 (Anttiroiko, 2012b) can also encompass ICTs used for participatory planning processes. PlanTech denotes the digitalisation of the planning system as a whole. It hinges on the accessibility and interoperability of data, software and hardware. PlanTech capitalises particularly on opportunities for integrations between big data, open data, geospatial visualisation and plan-making. The term is increasingly popular particularly in a UK context, driven by the initiative of the Royal Town Planning Institute (RTPI) and the UK government's Connected Places Catapult, as exemplified for example in their joint vision document (RTPI, 2019). Underpining PlanTech is an emerging economic market of start-ups, products and services, signalling the need for closer collaboration between local government and industry as well as greater involvement of the public. Early precursors of PlanTech included the Planning Portal discussed by Kingston (2002). The term Planning 2.0 (Anttiroiko, 2012b) likewise encapsulates a similar trend toward the digitalisation of the planning system, and points to substantial opportunities for active forms of citizen participation.

In sum, the diversity of classifications and terminologies mobilised in the literature indicate that DPPs are ontologically inseparable from their wider use context and the types of knowledge and stakeholder agency which they mediate. This diversity of use-based classifications provides freedom and flexibility at the same time as it hinders harmonized definitions of digital participatory technologies (Boehner & DiSalvo, 2016). Terminological diversity and fluidity also constitute a significant challenge to comprehensive, systematic literature reviews and comparative studies in the field of

digital public participation. A similar perennial challenge continues to affect the broader field of public participation at large (Arnstein, 1969; Carson, 2008; Fagence, 1974; Fung, 2015; Rowe & Frewer, 2005).

2.4.2 Citizens' role in the production of new urban data

Based on 48 cases covering a wide range of digital participatory platforms, and building on Arnstein's (1969) Ladder of Participation, Hasler et al. (2017) propose a new ladder of digital participation that takes into account the mode of citizen involvement, the type of urban data involved, and the role of citizens in relation to urban data production. The modes of citizen involvement are: 1) top-down information; 2) bottom-up information; 3) consultation; 4) contribution; 5) collaboration. "Empowerment", and related aspects of citizen involvement in decision-making, is left out from their model, on the grounds that it is "difficult to measure accurately" (2017, p. 233). They also include three levels of participation in data production, ranging from: i) use of open data for top-down information; ii) passive data production for bottom-up information (e.g. through sensors such as mobile apps); and iii) active data production for participation modes between consultation and collaboration. The model is particularly useful in taking stock of how evolutions in digital participatory technologies can equate with different modes and types of data production. In particular, it can guide critical evaluations of smart city strategies that fail to promote active modes of citizen involvement and associated data co-production processes. It adopts a three-dimensional continuum or ladder-based evaluation approach to digital forms of public participation.

However, by intentionally omitting "empowerment" as a mode of citizen involvement, the authors limit the model's usefulness to cases that do not feature any type of shared decision-making, which excludes increasingly widespread techniques such as participatory budgeting. In focusing on the production of urban data, it may also be ill-suited to the analysis of more deliberative technologies, and also fail to capture processes strongly characterised by social leaning.

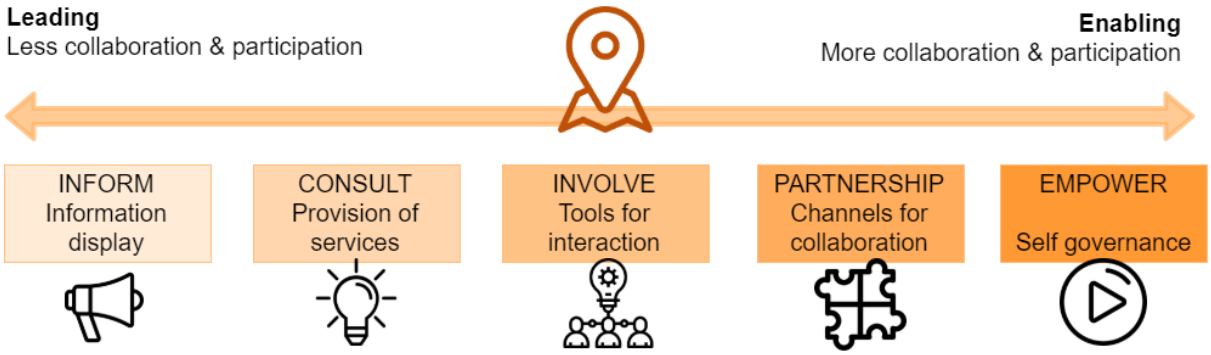
2.4.3 Levels of citizen-government relationship

Based on a systematic and extensive review of over 110 digital participatory platforms used in urban planning across the globe, Falco and Kleinhans (2018b) suggest four different levels of citizen-government relationship: 1) *information sharing*, sub-categorised as i) "informing" for top-down one-way communication (or "broadcasting") from government to citizens; and ii) "consulting" for one-way communication from citizens to government; 2) *interaction*, characterised by dialogue and feedback between government and citizens; 3) *co-production*, associated with reciprocal use of assets and resources between government and citizens; and 4) *self-organisation* by citizens that are more public or private in nature. The typology appears as discrete rather favouring a ladder or continuum/spectrum. Out of their initial sample, the authors identified 25 platforms that pertain to "co-production" as a mode of citizen-government relationship.

2.4.4 Categorisation of E-Tools

Møller and Olafsson (2018) suggest a categorisation of E-Tools (Figure 12) based on typologies developed by Falco and Kleinhans (2018b) and Sandoval-Almazan and Gil-Garcia (2012). The typology is articulated as a spectrum of interactive functionalities that technologically mediate different levels of collaboration and/or participation. While the participation categories echo with those on Arnstein's Ladder of Participation and the IAP2 Spectrum of Public Participation, the higher levels of participation/collaboration denote community self-governance, as do other models, such as Pretty's (1995) Typology of Public Participation presented in Appendix, and Falco and Kleinhans (2018b). Focusing on e-Tools for green infrastructure planning, the reviewed tools are mostly spatial in character and therefore facilitate geoparticipation.

Figure 12 - Categorisation of e-Tools (adapted from Moller & Olafsson 2018)



2.4.5 The Typology of Participatory Apps

Based on a review of 35 mobile apps of relevance to participatory urban planning, Ertiö (2015) developed the Typology of Participatory Apps. It encompasses three main dimensions of citizen participation: 1) *the type of data collected by citizens* (sub-classified as "environment-centric" or "people-centric"); 2) *information flow* ("one-way" or "interactive"); and 3) *empowerment of citizens* ("strategic" or "operational"). These three dimensions are inspired by the work of Kanhere (2011), Rowe and Frewer (2005) and Winstanley, Sorabji, and Dawson (1995) respectively. Environment-centric apps focus on environmental parameters, while citizen-centric "document user activities and aim at understanding behaviour". The typology simplifies Rowe and Frewer's (2005) own typology into a two-dimensional categorisation. The model also rearticulates Winstanley et al.'s (1995) distinction between operational power (i.e. service provision / policy implementation) and criteria power (i.e. level of stakeholder influence in shaping policy/services) as "strategic" and "operational", respectively. Overall, the model produces 8 different types of apps. Of these, "citizen impact apps" and "public dialog apps" are most relevant to the topic of this thesis. Citizen impact apps are one-way provision of feedback, views and ideas from citizens to organisations, but can also be passive modes

of data supply through simple device geolocalisation. Citizen impact apps are meant to influence strategic orientations in urban planning. Public dialog apps are more interactive in nature, with a stronger and more explicit dialogical component between organisations and citizens. Based on the definitions and case illustrations that inform the model, the vast majority of digital platforms investigated in the thesis would fit that category (although not all platforms might actually be available as mobile apps per se). Interestingly, Ertiö (2015) found that only two apps from the sample matched the public dialogue app type: *Textizen* and *Commonplace*. She also found that:

> There seems to be an indirect association between the typology's dimensions of data type, information flow, and empowerment: the more apps record environmental parameters, the more one-way communication they display and the more operational power they're likely to exhibit; the more apps tap into citizens' tacit local knowledge, the more dialogue is needed to understand those opinions and the more strategic power they entail (Ertiö, 2015, p. 316) [emphasis added].

Being technology-centric, the typology enables to make sense of the flurry of digital apps available, as well as keep track of technological evolutions. The typology seems to collapse Rowe and Frewer's (2005) distinction between "two-way communication" and "public participation" into the single category of "interactive" information flow, which in practice might make it difficult to differentiate between deliberative apps and apps that provide a wider range of interactive functionalities such as ranking, voting, ideation, and so on. The distinction between environment-centric and people-centric, although pragmatic, reproduces a dualistic separation between people and their environment that could support particular urban management ideologies and practices at the expense of more inclusive alternatives (Gandy, 2005; Swyngedouw, 1996), for example as part of data-driven smart city strategies that conceal complex governance arrangements (Albert Meijer & Bolívar, 2016). Although the typology developed by Ertiö (2015) focuses on mobile applications, it also applies to all manners of digital participatory platforms.

2.4.6 Four archetypes of technology-enabled participatory platforms

Based on their review of 25 technology-enabled (i.e. online) participatory platforms used in 16 of the 25 most populous cities in the US, Desouza and Bhagwatwar (2014) suggest a classification based on four archetypes based on focal interests and the type of data produced: (i) citizen centric and citizen data; ii) citizen centric and government open data; iii) government centric and citizen data; and iv) government centric and citizen-developed solutions. First, platforms that are citizen-centric and enable citizen-sourced data involve citizens as the principal actors on the platform who submit ideas that will be collectively vetted by the community, which are then be submitted to local government (e.g. Localocracy, Change by Us Philly). Citizen-centric platforms that utilise local government open data often focus on public health, crime and other data relevant to citizens' lived environment, and may enable citizens to report events and contribute data on the platform. Government-centric platforms that use citizen data seek citizen feedback and ideation for solutions (e.g. Speak up

Austin![8]). Desouza and Bhagwatwar (2014) view such platforms as facilitating two-way communication between city agencies and citizens. Fourth, government-centric and citizen-developed platforms typically concern mobile apps that utilise government open data for a joint design and delivery of digital services (e.g. NYC Big Apps[9]). The latter type is often termed "civic hackathons" in the literature.

The authors tentatively link their fourfold typology of participatory platforms to Arnstein's ladder of participation. Interestingly, none of their suggested model of participation match the 'delegated power' and 'citizen control' rungs on Arnstein's Ladder of participation, which contrasts with more recent reviews of participatory platforms (e.g. Falco & Kleinhans, 2018b). Furthermore, Desouza and Bhagwatwar (2014) classify reporting apps as mediating consultation of solutions, rather than one-way communication/information from citizens to local authorities.

2.4.7 Communication tools per communication type

Williamson and Parolin (2012) classify communication tools according to four communication types: i) monologue communication; ii) feedback communications; iii) responsive dialogue; and iv) mutual discourse. Monologue denotes one-way communication from local authorities to citizens (e.g. council meeting minutes, planning data and information, newsletters). Feedback tools include consultation tools, such as submitting comments about plans and development proposals. Responsive dialogue encompasses e-Government tools such as submitting development applications online. Mutual discourse includes discussion forums, blogs and social media. The classification appears to be discrete rather than linear. Focusing on New South Wales in Australia, the authors report that monologue tools were dominant in comparison to other communication types. Notwithstanding, and compared to previous studies (e.g. Evans-Cowley & Manta Conroy, 2006). The authors identify fewer hindrances in terms of budgetary constraints and technical expertise, observing the emergence of more affordable and non-technical tools such as *Bang the Table*. They also observed greater potential for local government to use social media to engage citizens.

2.4.8 Design empowerment through ICT-based platforms

Gün et al. (2019) adapt the design empowerment analytical framework for the participatory evaluation of different visualisation methods developed by Senbel and Church (2011a, p. 426) to the use of ICT-based platforms in urban planning. The Design empowerment framework comprises of 6-"I"s: Information, Inspiration, Ideation, Inclusion, Integration, Independence. Like the Categorisation of E-

[8] Now leveraged by *Bang the Table* US: https://www.speakupaustin.org/ [accessed 3 October 2019]

[9] NYC Big Apps now builds on blockchain technology: https://www.bigapps.nyc/ [accessed 3 October 2019]

Tools and the Levels of citizen-government relations reviewed above, the Design empowerment framework also features community self-organisation as a separate form of empowerment. Interestingly, and in contradistinction to all other models reviewed here, all instances of participant involvement, including *Information*, are conceptualised here as a form of empowerment, even though it is still considered a pre-requisite to subsequent levels of empowerment. *Inspiration* is conceived as generating interest among urban residents to take part in design activities. *Ideation* refers to urban residents' ability to contribute ideas and views about the urban environment. *Inclusion* is two-way in that it denotes residents' access to planning processes, including the assurance that their views will be take into account in decision-making, *as well as* planners' ability to access resident. Integration entails collaboration and partnership of citizens with planners in the co-production of plans and projects, and is portrayed as "perhaps the most equitable instance of empowerment" (Senbel & Church, 2011a, p. 426). *Independence* constitutes the highest level of empowerment, characterised by residents' capacity to make their own plans and visions, in turn enabling either relative community autonomy in plan-making, or "transformative mediation" through greater community cohesion in challenging municipal planning agendas. Gün et al. (2019) apply its use to the evaluation of 25 ICT-based platforms used in urban planning across Europe. They classify the platforms based on their observed functionalities upon which they make inferences about corresponding levels of design empowerment.

2.4.9 Empowerment-based design principles for Civic Technology

Adopting a feminist approach to inclusive user-centred design in Human Computer Interaction, Graeff (2018) suggests six complementary design principles that can empower end-users of Civic Technology, consisting of: i) inclusion at every stage of the design and use process, including at the evaluation stage; ii) enabling the agency of users beyond that intended by technologists; iii) providing opportunities for reflection and discourse between participants, including feedback loops and deliberation; iv) a careful consideration and respect of communities' needs and interests; v) intermeshing storytelling with data, for example to initiate reflection and deliberation, and generate greater understanding about complex planning situations; vi) rigorous and transparent evaluation of the empowerment component of Civic Technology, including through thorough metrics of participation. Graeff applies the framework to the investigation of the 311 reporting app *SeeClickFix* alongside a survey-based assessment of political efficacy (i.e. perceived level of influence upon a political process) among platform end-users.

2.4.10 Digital empowerment spiral

Writing at a time when digital tools were less pervasive in citizen participation, Mäkinen (2006) suggests the digital empowerment spiral to help foster greater digital literacy and participation in spatial planning and local policy-making. Digital empowerment first and foremost begins with technical skills and social networks, grows through the development of competence, and culminates in

a perceived sense of control over life, general welfare and greater inclusion in planning processes. Warning against the risk of an atomistic individualisation of participation, Mäkinen (2006, p. 393): "The practices and attitudes should be developed more towards collective innovations rather than individualistic one-way consuming."

2.4.11 Score-based modified Spectrum of Public Participation

Nelimarkka et al. (2014) modify Nabatchi's (2012) modified Spectrum of Public Participation by adding a 10-point scoring system to each of the categories of the IAP2 Spectrum. The model therefore enables to benchmark the objective fulfilment and types of information flow of different participatory digital technologies for systematic comparative analysis. The authors apply the scoring system to their observation of three different Civic Tech. The suggested model also provides performance statements that are tailored to the investigation of participatory platforms. For instance, for the objective category 'Collaborate', three statements are scored: i) "Participants can read each other's contributions"; ii) "It is possible to comment on the contributions"; iii) "The interface supports the sense making process". While enabling greater consistency in the investigation of different types of participatory platforms, the model is likely to suffer from the aforementioned shortcomings of the IAP2 Spectrum. Furthermore, assigning scores to the different categories of the Spectrum may prove subjective and therefore difficult to replicate with the intended validity.

2.4.12 Technology-based governance models

Anttiroiko (2012a) suggest a two-dimensional model that links Web 2.0 and Planning 2.0 tools with associated potentials for governance evolutions. The model provides a fourfold typology of discrete yet interrelated governance modes. *U-governance* denotes interoperability of data, software and hardware that builds on the ubiquitous distribution of digital technologies in society, including supporting ICT infrastructure. *G-Governance* relates to the geographic and location-based component of urban data, which encompasses both active and passive forms of citizen-contributed and alongside other forms of planning data. *Governance 2.0* is facilitated by digital tools for crowdsourcing, networking and co-production in urban planning. *Open Source Governance* builds on Governance 2.0 to leverage greater collaboration and transparency in planning processes and outcomes. The latter notion of Open Source Governance echoes with recent evolutions and imagined evolutions in the Civic Tech sector such as open source democracy, 'crypto-governance' and liquid democracy that seek to augment or challenge existing governance arrangements, for example through blockchain architectures (cf. Bertone, De Cindio, & Stortone, 2015; *Decidim*, 2019; Saul, Deville, & Jaboulay, 2018).

2.4.13 Typology of geo-participation methods

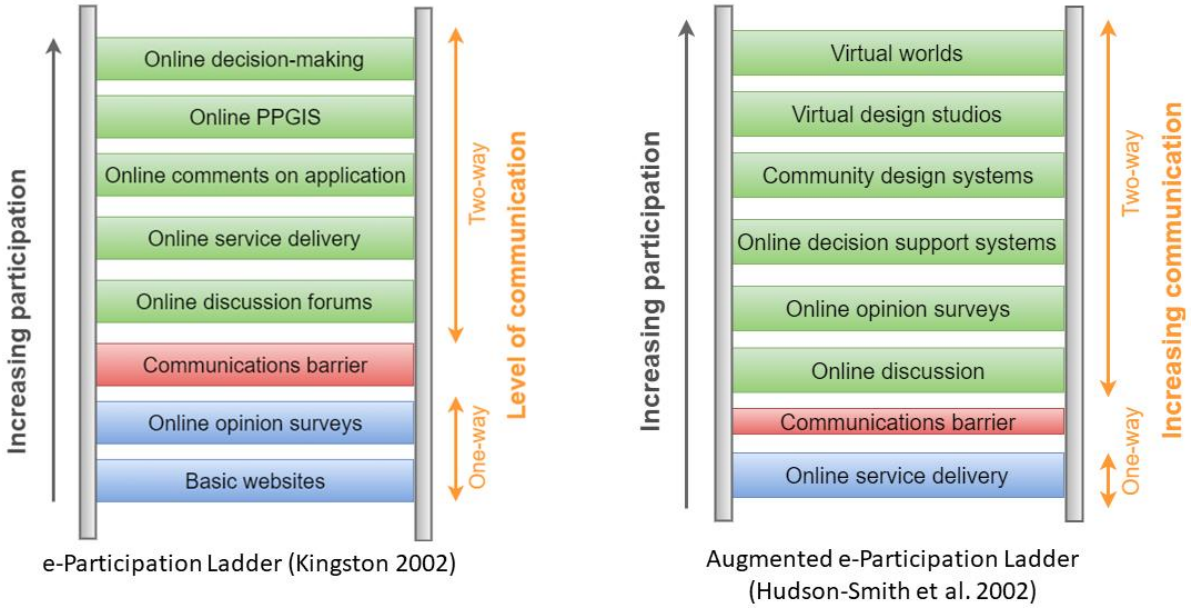
Based on a cross-cutting literature review of geo-participation methods, Zhang (2019, p. 40) provides a threefold classification of different modes of participation in spatial planning: 1) *consultative geo-*

participation, deployed to collect views and feedback from citizens, through government-initiated PPGIS or community-initiated, grassroots participatory mapping; 2) *transactional geo-participation* which builds on consultative geo-participation to improve government service provision and public data, such as 311-type of reporting of faults in the urban environment (e.g. potholes in roads; green park infrastructure requiring maintenance), or collaborative contributing and editing of government open data; and 3) *passive geo-participation*, characterised by passive sensing through geo-locational analysis of citizen-contributed data (e.g. social media use, mobile sensors, digital content with geo-locational/spatial attributes, and citizen science). Beyond the contribution of open data and reporting of urban maintenance requirements presented by Zhang (2019), transactional geo-participation can arguably include more participatory or even empowering mechanisms such as participatory budgeting, which can enable shared decision-making as well as co-design and co-implementation of projects (Parra et al., 2017). Additionally, the conceptualisation of transactional geo-participation can be augmented to include transactive approaches to planning, grounded in critical pragmatism. Geoparticipation methods can thereby help address spatial inequalities and identify opportunities for the co-production of urban solutions (Czepkiewicz, Brudka, et al., 2016; Falco, 2016; Hasler et al., 2017; Rall et al., 2018).

2.4.14 E-Participation & Augmented e-Participation Ladders

Figure 13 displays the E-Participation and Augmented e-Participation Ladders. Based on a review of a selection of pioneer PPGIS in spatial planning in the UK, Kingston (2002) suggests the E-Participation Ladder as a way of classifying the potential use of PPGIS for various forms of participation ranging from one-way to two-way communication flows.

Figure 13 - e-Participation Ladder and Augmented e-Participation Ladder (adapted from Kingston (2002) and Hudson-Smith et al. (2002) respectively)



The e-Participation Ladder portrays basic websites and online surveys as one-way communication flows, with online discussion forums providing a threshold for two-way communication between citizens and local planning authorities. Online decision-making is regarding as the top of the ladder of e-Participation, thereby echoing with Arnstein's Ladder of Citizen Participation. Interestingly, Andy Hudson-Smith et al. (2002) classify online service delivery as one-way communication, and place online surveys above online discussions. The ladders therefore display some subjectivity in the way they classify different modes and technologies of public participation. As such, the models are heuristic rather than definitive. As Andy Hudson-Smith et al. (2002, p. 8) argue:

> Any classification of diverse activities such as participation represents an oversimplification. [The Augmented Ladder of e-Participation] implies that as we move up the hierarchy, each successive step embraces lower steps on the ladder whereas no such strict embedding actually exists. Moreover at the top of the hierarchy, decision support, design systems and virtual worlds can collapse into one another and these stages are defined with examples of current practice in mind rather than based on any fundamental differences in the process of participation. However to show how the classification helps in thinking about online participation, we need to widen our discussion to embrace different types of user and to define different types of problem.

Alongside the heuristic use of the model, Andy Hudson-Smith et al. (2002) propose a fourfold Net Participation analytical framework that comprises of a list of providers (i.e. main commissioning actors or stakeholders), means of technological delivery (i.e. type of participatory technology), forms of delivery (i.e. form of participation), and targeted users/consumers. Provider and user groups can denote: individuals, community groups, politicians, interest groups, professional groups, professional experts and IT experts. Means of delivery range from web text and pictures to advanced 3D

navigation and rendering. Forms of delivery/participation range informational services to virtual worlds, as featured on the augmented ladder. The Net Participation matrix enables to map and align these basic people-based and technological dimensions of digital engagement. Both the e-Participation Ladder and the Augmented e-Participation Ladder enable to make sense of different types of participatory technologies, and suggest that they can be further customised as per context. An incremental ladder-based approach, however, bears inherent limitations.

2.4.15 The '3E' Framework

Regarding the evaluation of participation on the Geospatial Web (Geoweb) specifically, Walker and Rinner (2013) propose an evaluation framework that comprises of three key dimensions: 1) *engagement*; 2) *empowerment*; and 3) *enactment*. These are articulated around interactions between the provider realm (i.e. the organisation initiating and administrating the participatory Geoweb projects) and the public realm (i.e. the participants-users in the participatory Geoweb project). Together, these three key dimensions of participation and the design of both provider and public realms are backed by 20 substantive questions that can guide the design and evaluation of user participation on the Geoweb. *Engagement* is addressed in terms of: i) means of recruitment for the Geoweb project; ii) the desired number of participants and frequency of participation; and iii) a strong rationale for using the Geoweb as a means of participation. *Empowerment* relates to a range socio-political conditions, including participants' information needs, digital literacy, and stakeholder status, as well as more technical and technological components of participation, such as the types of contributions made by participants (e.g. views, proposals or observations), the type of features contributed (both spatial and non-spatial), and how these contributions reshape power dynamics between the provider and the public. *Enactment* relates to the way in which participant input is used in decision-making and subsequently implemented by the provider. Key points to consider for enactment include the extent to which input is implemented in decision-making, how the results correspond with participants' expectations, reporting-feedback mechanisms of the results to the public, and the possibility of a participatory review or assessment of the participatory process itself. More broadly, the public realm can be characterised in terms of who the targeted publics are, the publics' use of the space being investigated, the range of motivators that spur the publics to participate, and the nature of the publics' relevant expertise. The provider realm needs to be defined by identifying the provider organisation, the rationale for conducting the project and seeking input from the target publics. While qualitative by nature, the authors suggest that users could devise a scoring system to quantify satisfaction regarding the process from the perspectives of the provider and publics. The framework can be applied to the Geoweb as whole, primarily to Public Participation GIS projects, but possibly also to VGI and community mapping initiatives. Last but not least, the framework can contribute to

fill in knowledge gaps about the strengths and weaknesses of Geoweb-based participation in a variety of spatial planning contexts.

2.4.16 Interlinking DPP ontologies, models & approaches to participation

Depending on their focus, the models and ontologies weave together citizen data, platform design and technological features, objectives for public participation and governance arrangements. Some models focus more explicitly on *governance dimensions* (Anttiroiko, 2012a; Walker & Rinner, 2013), *the type of citizen-contributed data* (Desouza & Bhagwatwar, 2014; Ertiö, 2015; Hasler et al., 2017; Zhang, 2019), or the *relationships between the public and local government* and associated objectives for public participation (Afzalan & Muller, 2018; Falco & Kleinhans, 2018b; Møller & Olafsson, 2018). Some models focus on geoparticipation (Walker & Rinner, 2013; Zhang, 2019). Due to the interdependencies between technological features, objectives for public participation and the type of citizen-contributed data, there are strong overlaps between the different models. Some models consider several dimensions simultaneously. For example, Hasler et al. (2017) classify ICT platforms based on the type of citizen-contributed data and the associated government-citizen relationship. The multidisciplinary literature on DPPs therefore reveals strong interconnections between technological features and their wider use-contexts. As such, the models presented here strongly overlap with the classifications of organisational and institutional factors in the other chapter of the State-of-the-Art in this thesis. Altogether, the different DPP models and ontologies reveal a wide range of objectives for digital participation supported by an equally wide range of digital tools. They also enable to assess the influence of DPPs in a more or less detailed manner. They can also link the use of DPP features with institutional factors.

Every model comes with its strengths and shortcomings, however. Context-dependent and technology-related factors not catered by the models may be missed. Accordingly, researchers typically combine the development of models with a discussion of organisational, institutional and various technological factors that influence the use of the DPPs. It may also prove difficult to compare different types of DPPs used for different planning projects and/or at different planning scales. This limitation arguably applies to all conceptual models. One can posit that the more comprehensive the analytical model, the greater the chances of encompassing the main dimensions that determine the use of DPPs in urban planning. The different models also enable to navigate and make sense of the diversity of ontologies and terminologies mobilised in the literature. As different analytical models build on and cross-reference each other over time, it is also interesting to note that model development evolves over time to match concurrent evolutions in digital participation, including the specificities of different technologies and use-contexts. In this regard, perennial models such as the Ladder of Participation and the Spectrum of Public Participation still seem to function as landmarks in the field of digital participation.

2.5 Tools & methods for public participation

A broad spectrum of tools, methods and media facilitate various levels of public participation in urban planning. Common in-person tools and methods for public participation include: traditional public meetings (a.k.a. public hearings), workshops, informational drop-ins, public exhibitions and informational stalls in public space. Common participatory in-person methods include citizen juries, neighbourhood assemblies, and participatory budgeting. Some participatory methods are becoming increasingly popular. For example, the number of local government agencies adopting participatory budgeting has risen over the past decade (Cabannes & Lipietz, 2018; Falanga & Lüchmann, 2019; Gavrilova, 2018; Kamrowska-Zaluska, 2016; Porto de Oliveira, 2017; Sintomer, Röcke, & Herzberg, 2016; The Democratic Society, 2016; Touchton, Wampler, & Spada, 2019).

Common communications media include: online and printed newsletters, physical mail, emails, flyers, local council websites, local newspapers, local news websites, social media, dedicated engagement websites and/or web pages for specific planning projects, programmes and policies.

The uptake of digital participatory tools in local government seems to have taken off since about 2015. In conjunction with simultaneous evolutions in web-based participatory technologies and urban governance, there has been a growth in the range and number of participatory platforms used in spatial planning (Billger et al., 2016; Falco & Kleinhans, 2018b; Gün et al., 2019; Hasler et al., 2017). Writing in 2010, Mandarano, Meenar, and Steins (2010, p. 132) reported: "Although still in its infancy, planners are beginning to use digital technologies to facilitate direct civic engagement." Comparatively early studies (i.e. pre-2010s) report the use of the following digital communications and engagement tools by local authorities: traditional websites, web-based surveys, e-mail, texting and SMS, blogs, RSS feeds, social media and networking (e.g. Facebook, LinkedIn), wikis, mash-ups (especially map-based applications), Public Participation GIS, 3D participatory visualisation, virtual 3D city portals, Virtual Reality (e.g. Second Life), CAVEs, gamification, immersive visualisation, crowdsourcing websites, video sharing, virtual meetings and collaboration, and planning-related wikis (cf. Al-Kodmany, 2001b; Evans-Cowley & Hollander, 2010; Firmino, 2003; S. Graham & Aurigi, 1997; Hanzl, 2007; Andrew Hudson-Smith, Evans, & Batty, 2005; Kingston et al., 2000; Mäkinen, 2006; Mandarano et al., 2010; Salter, Campbell, Journeay, & Sheppard, 2009; W.-N. Wu et al., 2006).

While these provide evidence of pioneer digital applications for participatory spatial planning, the majority seemed largely experimental (Hanzl, 2007). Basic Web 1.0 and Web 2.0 communication tools such as traditional websites, emails and newsletters seemed significantly more widespread (Mandarano et al., 2010). Applications such as the (3D) Virtual London project (Andrew Hudson-Smith et al., 2005) were fully operative when launched, yet ahead of their time because too innovative for existing planning and decision-making workflows (Andrew Hudson-Smith, 2017). By way of

example, the *Smart London Vision* and the *Smart London Plan* issued by the Greater London Authority in 2013 and the *Smarter London Together* strategy published in 2018 may be catching up with the creative potential of innovative participatory technologies (M. Foth, Hudson-Smith, & Gifford, 2016; Greater London Authority, 2018; Smart London Board, 2013). At the same time, data-driven smart city initiatives run the risk of either obfuscating or adopting participatory technologies for their own sake, rather than enabling effective participatory planning endeavours. The increasing use and interoperability in digital technologies highlights the need for people-centred design and service provision and a greater consideration of social-value and equity driven innovations (Castelnovo et al., 2016; Albert Meijer & Bolívar, 2016; Albert Meijer & Thaens, 2018; Ruhlandt, 2018; Smarticipate, 2019).

Some innovative technologies such as immersive geovisualisation, Augmented Reality, and gaming have been around since the 2000s but their actual use in spatial planning still remains largely exceptional or experimental (Cirulis & Brigmanis, 2013; M. Foth et al., 2016; Gordon & Koo, 2008; Lange, 2011; MacEachren & Kraak, 2001; Olszewski, Gnat, Trojanowska, Turek, & Wieladek, 2017; Orenstein, Zimroni, & Eizenberg, 2015; Portman, Natapov, & Fisher-Gewirtzman, 2015; Reinart & Poplin, 2014; Torner, White, & Waggoner, 2012). Simple gaming applications such as Minecraft have been comparatively more widespread due to their popularity as digital entertainment media among children (Mather & Robinson, 2016; T. K. Nielsen, Lyngby, & Dalå, 2016; Westerberg, 2014).

Some recent DPPs function as one-stop community engagement portals for municipalities (e.g. *Bang the Table*, MindMixer, *Cap Collectif*). Pioneer initiatives at creating comprehensive, 'one-stop' planning portals include the so-called *Planning Portal* in the UK in the early 2000s, which is described by Kingston (2002, p. 3) as follows:

> The Planning Portal is being promoted as the 'one-stop shop' for all planning information providing access to planning application forms, development plans and a facility to track planning applications and appeals among its many services. The system is still in the very early stages of development and many of these services will not be available for some time. At the moment there is no mention of the Portal offering participatory approaches and it appears that the system will give people the "right to know" and the "right to object" but not the ability to "participate in actual decision making".

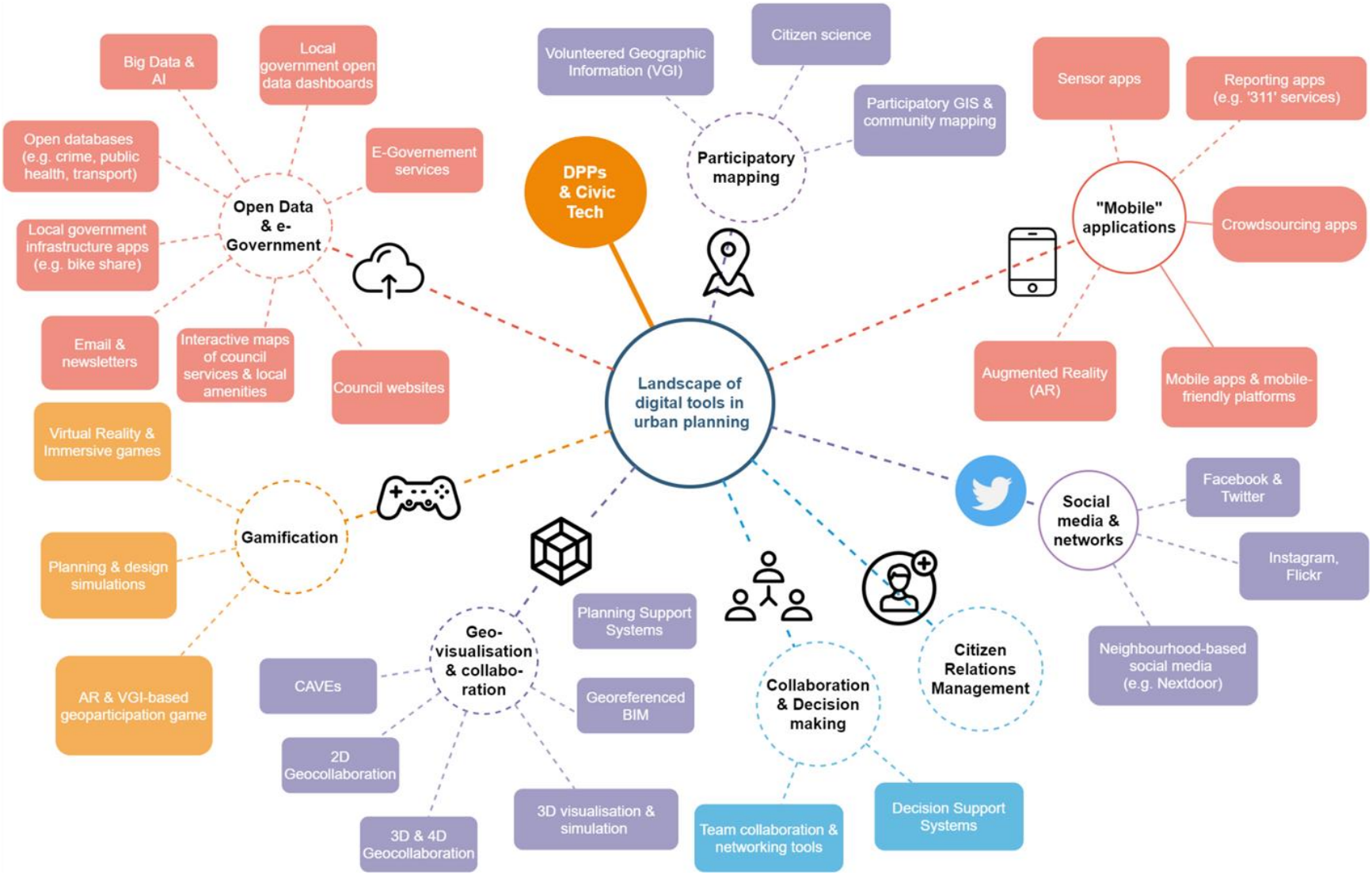
Interestingly, generalist DPPs such as *Bang the Table* function as 'one-stop engagement shops', while planning-related e-Government services are typically delivered via planning council web pages, which may also feature links to the aforementioned engagement portals. The reviewed literature does not seem to mention any all-inclusive planning portals that combine e-Planning and engagement services in one single URL or application.

In the late 1990s and early 2000s, pioneer virtual city portals were met with suspicion by critical analysts, on the premise that they might deepen gaps between the technology-savvy and marginalised

groups in society. To this day, studies still refer to the digital divide as one of the main hurdles to the use of digital tools by citizens in spatial planning (Alverti et al., 2016; Falco & Kleinhans, 2018a; M. Foth et al., 2016; Gün et al., 2019; Kahila-Tani et al., 2019).

Figures 14 maps the broad landscape of digital technologies used in urban planning.

Figure 14 - Landscape of digital tools used in urban planning (own elaboration)



Common digital tools include social media, DPPs, geoparticipation, and participatory budgeting portals. The landscape of digital tools also includes a wide range of Web 2.0 tools and interoperable digital technologies that are indirectly related to public participation, such as various collaboration tools, location-based services, and planning-related technologies such as tools for planning design, planning simulation, data visualisation, construction-management, property-management and architectural design tools. Additionally, Customer or Citizen Relations Management (CRM) tools can also support online engagement, e-Government services and New Public Management (NPM) in the public and private sector (Nanos, Papaioannou, Androutsou, & Manthou, 2019; Sivarajah, Irani, & Weerakkody, 2015; John Clayton Thomas, 2017). The broader landscape of digital tools is particularly salient when considering interoperability factors for ICT infrastructure, hardware, software and data in local government, planning consultancies, property developers and other contractors, and the corresponding potential for digital participation (Anttiroiko, 2012b; Rinner et al., 2008; Thompson, Greenhalgh, Muldoon-Smith, Charlton, & Dolník, 2016; Twitchen & Adams, 2012; Warf, 2013). Illustrating the importance of interoperability and multiplicity of digital technologies, the influential planning blog *Planetizen* provides a yearly review of the most used web and mobile applications of relevance to spatial planning, initiated by Jennifer Evans-Cowley (see Brasuell, 2019; Evans-Cowley, 2016).

General considerations about DPP features relate to usability and user experience, and associated ranges of functionalities. Empirical studies show that usability constructs focus on technological efficiency and effectiveness, while user experience constructs favour the perceived quality of interaction, including factors such as fun, satisfaction and sense of fulfilment (Brooke, 1996; Hassenzahl, 2004; Hassenzahl, Diefenbach, & Göritz, 2010; McCarthy & Wright, 2004; J. Nielsen, 1993, 2012; Tuch, Roth, Hornbæk, Opwis, & Bargas-Avila, 2012). The user experience of DPPs seems understudied in comparison to the wider field of HCI, as studies typically focus on usability components and platform functionalities (Afzalan, 2015; Falco & Kleinhans, 2018b; Gün et al., 2019; Haklay & Tobón, 2003; Hasler et al., 2017; Meng & Malczewski, 2010; Rzeszewski & Kotus, 2019). The notion of affordances can bridge this gap. From the standpoint of activity theory (Kaptelinin & Nardi, 2012), affordances denote the sum of functionalities, uses, values and identities which advanced technological tools provide to people. As individuals can have different cognitive capacities and interests, tools may offer a diverse range of affordances to different users. In the investigation of the reporting app *SeeClickFix*, Graeff (2018, p. 81) invokes user freedom and expressivity as key design considerations:

> Ideally, civic technologies should fulfill the original promise of the internet, articulated by Jonathan Zittrain (2008) and others, to enable generativity: i.e., they should empower users to solve problems beyond those the tool builder intended to solve.

Other studies also advocate a strong digital design empowerment (Atzmanstorfer & Blaschke, 2013; Gün et al., 2019; Mäkinen, 2006; Pak & Verbeke, 2014; Senbel & Church, 2011b).

2.6 Chapter summary

This chapter reviews some of the main approaches to and analytical models about public participation, including digital forms of public participation. Landmark models such as Arnstein's (1969) Ladder of Participation and the IAP2 Spectrum of Public Participation (2018) have inspired a flurry of alternative models, each with their own main focus of enquiry and domain of application. Subsequent models have further built on each other to advance effective research and practice. Interestingly, DPP models do not necessarily portray citizen control of local government decisions as the penultimate goal for digital participation. Instead, the higher levels of empowerment are articulated as self-mobilisation and governance of communities. This identified analytical preference for partnership and community self-organisation is mirrored in both DPP models and more general models of public participation upon which DPP models are largely based. The review therefore both confirms and attenuates the influence of models such as Arnstein's Ladder of Participation and the Spectrum of Public Participation on planning research.

The diversity of approaches and models is both a boon and a curse for the design, conduct and evaluation of public participation. It is a boon because it provides ample sources of inspiration and a range of both generalist and more approach-specific models that can be adapted to particular contexts. It is a curse because the approaches and models provide competing understandings and framings of the value of public participation. These mixed blessings also affect models of digital participation. Their ontological and epistemological implications in relation to the main findings in the thesis are treated in the discussion chapter. A careful consideration of the issues presented in this chapter also necessarily echoes with the review of the range of socio-technical factors that affect the design and conduct of public participation in general, and digital forms of participation in particular.

The literature also reports a growth in the adoption and use of DPPs in urban planning particularly since about 2015. While most digital tools were previously used for communications purposes, a growing number of tools now facilitate consultation and co-production. These evolutions correspond to recent evolutions in Planning 2.0 practices presented in the other part of the State-of-the-Art. The DPP models highlight three main dimensions to effective digital participation, including: i) *governance-related design factors* in the form of design empowerment; ii) *the type of citizen-contributed data* collected via the DPPs; and iii) *the type of citizen-government relationships,* and the corresponding of roles of citizens in participatory planning processes. Enduring research gaps include

how to best combine DPPs with other tools, how to best align DPP use with public participation objectives and contributing comparative and systemic empirical insight about the flurry of DPP tools now used in urban planning.

3 Planning processes

3.1 Introduction

This chapter reviews the main organisational and institutional factors that affect the use of DPPs in urban planning. It weaves the state-of-the-art in E-Governance, E-Government, emerging Planning 2.0 processes and practices, digital divides, prevailing institutional and organisational factors, organisational and individual dynamics of innovation in the public sector, and the rationale for joint knowledge production through participatory planning. Finally, noteworthy classifications and diagrammatic overviews of the reviewed organisational and institutional factors are presented in a diagrammatic way.

3.2 E-Governance & e-Government by default

E-Governance is the simultaneous evolution of government reform and technological innovation. E-Government is the provision of a wide range of government services by online means (Boughzala, Janssen, & Assar, 2015; Zhao, Shen, & Collier, 2014), now increasingly *by default* in countries such as the UK (Choudrie, Ghinea, & Songonuga, 2013; PASC, 2013, p. 21). E-Governance is associated both with a desire to improve the accessibility and transparency of government information and services, and can also be associated with lowering costs in government expenditure, for example in contexts of financial austerity. Based on an extensive literature review, Alzahrani, Al-Karaghouli, and Weerakkody (2017) identify four clusters of factors that determine citizens' trust in e-Government and their subsequent adoption of e-Government services: 1) technical factors (system quality, service quality, and information quality); 2) end-users' personal characteristics (disposition to trust, internet experience, education); 3) government agency factors (reputation of the agency, past experience); 4) risk factors (mainly performance and security and privacy issues). The digital divide remains one of the most important hurdles to the adoption of e-Government, and affects individuals who have access to digital technologies, but do not or cannot use them for civic purposes (Helsper & Reisdorf, 2016; Myeong, Kwon, & Seo, 2014; Zhao, Collier, et al., 2014)[10]. Emerging trends in e-Governance are associated with an increasing breadth of technologies for public engagement. [11]. They are also related to the increasing digitisation and technological sophistication of workflows in urban planning, a trend which has been coined "Planning 2.0" by some analysts. Processes of urban planning and management are increasingly digitised and management services are outsourced to technology

[10] See Section "Digital Divide(s)" for a more complete discussion of these issues

[11] See Section "Review and assessment of main tools and methods for public participation"

providers globally, which poses new threats to inclusive governance, notably in contexts of smart city strategy development and implementation (Cowley, Joss, & Dayot, 2018; Viitanen & Kingston, 2014).

3.3 Planning, Web, & Cities 1.0 to 3.0

Current innovations in urban planning tap into concurrent evolutions in web technologies, digital consumer technologies, geospatial visualisation technologies and the digitalisation of planning processes. Beginning in the early 2000s, the process of digitising planning processes has evolved alongside the growth in interactive features on the internet (Anttiroiko, 2012b; Kingston, 2002; Silva, 2013). The term 'Planning 2.0' encompasses continuous developments in Web 2.0 technologies, evolving workflows within organisations carrying out spatial planning work, new urban governance arrangements, and broader trends such as the increasing penetration of digital technologies in society (Anttiroiko, 2012b). Compared to the Web 1.0 which was characterised by limited interactivity and users' passive consumption of static types of content, the emergence of Web 2.0 functionalities signalled a clear evolution toward greater content production by users themselves (i.e.'produsers': productive users). Emerging interactive features included discussion fora, participatory maps, the digitisation of government services (i.e. E-Government), simplified website development, social networks and various other simplified media content creation (Brabham, 2009; Bugs, Granell, Fonts, Huerta, & Painho, 2010; Evans-Cowley & Hollander, 2010; Evans-Cowley & Manta Conroy, 2006; Goodchild, 2009; Kingston et al., 2000). Planning 2.0 also denotes the increasing interoperability of data across different software. Thanks to cloud computing, data can be visualised and processed across multiple platforms. In terms of community engagement, interoperability enables input from urban residents to be downloaded and used directly in professional planning software.

These concurrent evolutions signal to recursive socio-technical change and adaptation both within organisations and between organisations and citizens (Anttiroiko, 2012a, 2012b; Billger et al., 2016). Anttiroiko (2012b) identifies four main technological trends that relate to urban planning and management: 1) the rise of Open source software and systems; 2) an explosion in social media use, associated with co-production of web content and widespread sharing of content; 3) the abundance of locational information; and 4) ubiquitous digital technologies and sensors. Together, these four trends influence social interaction among and between lay and professional communities, leading to what Anttiroiko terms the 'City 2.0'. Whereas the City 1.0 denoted interactive maps and 3D models of cities for visualisation purposes only (e.g. S. Graham & Aurigi, 1997), Web 2.0 technologies have enabled greater interactivity in all aspects of the visualisation and planning of cities. Web 2.0 technologies have thereby leveraged participatory mapping and visualisation on a large-scale, which were hitherto limited to expert-facilitated workshops (e.g. Al-Kodmany, 1999) The growth in cloud

storage of data and advanced visualisation techniques have supported web-based 3D city portals where citizens can not only navigate, but also contribute ideas and comments in virtual environments (Hjerpe et al., 2018; Steiniger, Poorazizi, & Hunter, 2016). Similarly, Public Participation GIS and one-stop engagement portals facilitate the work of online public participation by city agencies (Afzalan & Muller, 2018; Desouza & Bhagwatwar, 2014; Kahila-Tani et al., 2019).

The latter technological trends also enabled the production of the 'City 3.0', characterised by systemic intelligence, for example building on the CityGML format, which is "the international standard of the Open Geospatial Consortium (OGC) for the representation and exchange of 3D city models" (Gröger & Plümer, 2012). The City 3.0 is named after concurrent evolutions in the Web 3.0 (Lassila & Hendler, 2007), also coined the 'Semantic Web', that taps into the power of complex algorithms for various monitoring and predictive purposes. Vishnivetskaya and Alexandrova (2019, p. 3) describe smart cities 3.0 as "a completely integrated infrastructure [that enables] on-line management of all city processes". Examples of City 3.0 applications include smart city strategies and digital platforms that seek to integrate multiple sources of data, including input from citizen participation (Bednarska-Olejniczak, Olejniczak, & Svobodová, 2019; Carta, 2015; Castelnovo et al., 2016).

So far, the Web 3.0 has mostly been associated with 'smart', bespoke commercial advertising content based on individual internet users' personal behaviour, tastes and preferences. Urban planning can therefore tap into data produced through both Cities 2.0 and 3.0, where the use of Web 2.0 tools can inform both citizen involvement and organisational decisions and management as part of an iterative planning cycle that needs to address the complexities and challenges of global-local and virtual-real dialectics. Anttiroiko (2012b, 23) further maps the transformative potentialities of Planning 2.0 with associated sets of Web 2.0 technologies, ranging from informational tools to tools that help reconfigure governance and planning logics. The maturity level of Planning 2.0 practices correlates closely with the potential to tap into the increasing sophistication and interactivity of ICT tools. The most transformative potential emerges from a combination of both Web 2.0 and Web 3.0 potentialities, and translates into recursive governance, planning, and technological innovation. Emerging practices, on the other hand, associated with technologies for sharing feedback and deliberation, now seem fairly common, as does the use of social media for Interactive Planning 2.0 purposes, although their use also signals potential for greater effectiveness (cf. Bonsón, Royo, & Ratkai, 2015; Ertiö, 2015; Falco & Kleinhans, 2018b, 2018c; Kleinhans et al., 2015; Williamson & Parolin, 2013b).[12]

[12] See the section on "methods and tools for public participation".

Together these technologies can help reshape governance arrangements, by way of four emerging technology-based governance concepts: i) *Open source governance*, characterised by openness, modifiability and collaboration, and supported by open, transparent governance platforms; 2) *Governance 2.0*, characterised by crowdsourcing, social networking, short messaging, data co-production and further associated with broad citizen and stakeholder involvement; 3) *G-governance*, characterised by geographic and locational information and related locational aspects of governance and policy making; and 4) *U-governance*, characterised by multiple channels of distribution, flexible access, interoperability, and systemic intelligence, thanks to a backbone of ubiquitous digital infrastructure (Anttiroiko, 2012a). These processes can be further complemented by distributed, more open forms of grassroots participatory mapping, thanks to a variety of open-source GIS and online mapping technologies for participatory GIS and Volunteered Geographic Information that enable the production of citizen-produced geographic data of various kinds. The latter technologies have been used in a wide variety of contexts, including citizen science, disaster mapping, and various community mapping efforts that can aid communication between citizens and government agencies as well as community self-organization, although significant challenges remain in terms of the participant representativeness as well as in terms of local government acceptance of these community-driven processes (cf. Brandusescu & Sieber, 2017; Brown & Kyttä, 2018; Dionisio, Kingham, Banwell, & Neville, 2016; Goodchild, 2009; Haklay, 2013; Haklay et al., 2018; Andrew Hudson-Smith et al., 2009; Verplanke, McCall, Uberhuaga, Rambaldi, & Haklay, 2016; Warf, 2013). As both local government and community groups continue to innovate in their adoption of digital technologies to engage various publics in a variety of planning-related contexts, these emerging trends indicate new cultures of civics and open the way to new, or renegotiated roles, with potential for local government to reposition itself as convenor or coordinator of public participation innovations, rather than as provider (Boehner & DiSalvo, 2016).

While technological possibilities are ripe, Anttiroiko (2012b, p. 27) warns that "unless planning processes are opened up and democratised, there will be no breakthrough associated with the use of Web 2.0 tools." Anttiroiko (2012b) further envisions two possible development pathways: one strongly characterised by a virtuous cycle of openness and socio-technical transformation; and the other characterised by the co-existence of die-hard technocratic and managerial practices resisting alongside more progressive rally calls for citizen-centred approaches to governance. The main hurdle to a full actualisation of transformative Planning 2.0 seems political rather technological. Notwithstanding, other authors have also listed substantial technical hurdles such as: i) data quality of citizen-produced data; ii) the need to create or improve in-built data management and analysis interface for digital platforms that function as planning support systems; iii) the subsistence of both primary and secondary digital divides; iv) issues related to effective 3D visualisation; and v) the

potential to strengthen the interoperability of data and software (cf. F. Biljecki, J. Stoter, H. Ledoux, S. Zlatanova, & A. Çöltekin, 2015; Billger et al., 2016; Brown & Kyttä, 2014; Sieber et al., 2016).

3.4 Digital divide(s)

The digital divide broadly refers to inequalities in access to digital technologies and use of internet. It can denote both the lack of access to devices (i.e. primary digital divide) as well as the lack of skills or even interest on the part of the digitally marginalised in society (i.e. secondary digital divide) that would affect non-use of internet. As the penetration of digital technologies continues to increase, digital divides evolve accordingly. Nonetheless, they remain entrenched in effect, even as skill levels may increase, leading to increasing gaps and disparities in internet use in society (Bélanger & Carter, 2009; Helsper & Reisdorf, 2016; van Deursen & van Dijk, 2015). Even where digital technology in the form of smartphones and other devices may be readily available, their owners may not use them to further personal career or civic interests (Clayton & Macdonald, 2013; Macdonald & Clayton, 2013). The focus on the digital in divide largely arose with political efforts to increase social inclusiveness in Europe from the 1990s onward, with digital inclusiveness being mobilised as one of the main indicators of civic participation and as leveraging equality of opportunities in society (Selwyn, 2004). However, the determinants of the digital divide are multi-faceted rather than singular; they include personal factors such as age, ethnicity, professional status, personal motivation, gender, level of physical ability/disability, frequency of use, type of use, as well as broader societal factors such as policy, pace of industrial/technological development, and scale, and will affect different groups and individuals in society heterogeneously (Bélanger & Carter, 2009; Cavallo et al., 2014; Clayton & Macdonald, 2013; Crutcher & Zook, 2009; Dolan, 2016; Tsatsou, 2011; Zhao, Collier, et al., 2014).Therefore, because of the complexity of digital divides, disparities in the use of internet technologies elude simplistic discourses that portray the problem solely in terms of "haves" and "have-nots" (Dolan, 2016; Epstein, Newhart, & Vernon, 2014; Selwyn, 2004). As an illustration of the enduring disparities in digital use, Go ON UK (2015) estimated that more than one in ten people in the UK lacked basic internet skills such as "managing information" and "communicating" online, with people aged over 45 being more vulnerable than other age groups.

As a result, the digital divide in society remains a major hindrance to e-Governance and participatory Planning 2.0, in terms of access to e-Government services and digital methods for public participation and deliberation (Cavallo et al., 2014; Choudrie et al., 2013; De Marco, Robles, & Antino, 2014; Epstein et al., 2014; Gottwald, Laatikainen, & Kyttä, 2016; Haklay, 2012; Myeong et al., 2014). The digital divide is also problematic as local government restructuring is associated with the online provision of public services *by default* (Choudrie et al., 2013; PASC, 2013, p. 21), at the possible expense of face-to-face service provision. It may be that citizen-users still show a marked preference

for in-person communication, over Internet-based communication options when they perceive their request as being rather complex (Ebbers et al., 2008; Gagnon, Posada, Bourgault & Naud, 2010; Streib & Navarro, 2006). Online government information is not always easily accessible, which can affect the provision of public services, particularly for more sensitive segments of society such as older people, poor people, and immigrants (cf. Choudrie et al., 2013; Helsper & Reisdorf, 2016; Khorshed & Sophia, 2015; Selwyn, 2004). Evidence from across the board of community engagement methods indicates the need to combine both online and traditional in-person methods of engaging the public (cf. Biggs, 2015; Brown et al., 2014; Hasler et al., 2017; Mandarano et al., 2010; Stern et al., 2009). As online mapping and other digital technologies for public participation become increasingly available and accessible in spatial planning the world over, the digital divide remains one of the biggest hurdles to their inclusiveness and effectiveness in engaging urban residents (Cavallo et al., 2014; Crutcher & Zook, 2009; Haklay, 2012; Haklay et al., 2018; Jankowski, Czepkiewicz, Młodkowski, Zwoliński, & Wójcicki, 2017; Sieber et al., 2016).

3.5 Institutional & organisational factors for participatory planning

Factors that affect public participation at large will necessarily affect the conduct of digital forms of public participation. Fung (2015) highlights three main institutional barriers to participatory public policy-making and implementation: i) lack of political leadership; ii) lack of shared understandings of what constitutes effective public engagement (with related lack of benchmarking of best practices); and iii) lack of effective public engagement outcomes that redress socio-political inequalities in society (i.e. shortcomings in distributive justice). In terms of leadership, innovative public participation practices are best adopted institutionalised through the momentum instigated by champions, for example by elected officials or forceful civil servants. Ensuring strong leadership from the start of a participatory process might help prevent shallow citizen involvement arising from the fact that "often, participation projects are born from the coincidental alignment of forces" (Fung, 2015, p. 8). A lack of a clear understanding of what constitutes effective participation can also be linked to poor leadership. When a vision or clear sense of purpose is missing, the steps or milestones that constitute a participatory process may fall short of delivering their full potential. Thirdly, and related to the former two potential hindrances, is the risk of trivialising both the processes and outcomes of innovative participatory practices. Poor outcomes and/or processes can lead to general disappointment for both government agencies and citizens. In turn, disillusionment can feed a downward spiral of distrust about the potential of participatory technologies to leverage effective involvement and added-value in spatial policy making. Concurrent to these challenges, Fung (2015) highlights that silo functioning within public administrations is not conducive to the problem-solving approaches required to address the many 'wicked' or complex problems that characterise spatial planning (Rittel & Webber, 1973), and therefore proposes greater internal collaboration within and

across organisation as a pre-requisite for multi-sectoral problem-solving initiatives, and further enhanced by increased citizen involvement.

Legal frameworks, statutory requirements and national policy recommendations also shape opportunities for citizen participation in urban planning in various ways (Afzalan et al., 2017; Bąkowska-Waldmann, Brudka, & Jankowski, 2018). Innovative forms of citizen participation are typically voluntary initiatives on the part of local government and go beyond statutory requirements, as these are typically weak in that they require public consultation too late in the planning process or stifle creative and innovation in citizen participation (Innes & Booher, 2004; Kahila-Tani et al., 2019). Bureaucratic red tape may also prevent the adoption of online participatory technologies by local government (Brown & Kyttä, 2014). While statutory requirements exist to ensure minimum public consultation about planning policies, these do not seem to specific or stipulate how citizen input should be integrated in decision-making (Agger & Löfgren, 2008; Bąkowska-Waldmann et al., 2018; Galuszka, 2019). The case of participatory budgeting contrasts with other forms of citizen participation as it is characterised by city-specific procedures that stipulate the nature and extent of citizens' decision-making power (Cabannes & Lipietz, 2018; Miller, Hildreth, & Stewart, 2019).

Several hindrances to interactive forms of public participation are attitudinal in character. Planners are sometimes reluctant to adopt interactive participatory technologies for engaging people, which can hinder their use in spatial planning (An & Powe, 2015; Brown, 2012; Lawrence, James, & Jessica, 2000; Slotterback, 2011). Instead, planners may prefer to inform and educate the public about complex issues, such as public budgeting, rather than seek active input. Furthermore, the democratic deficit and related low civic engagement in society (e.g. Putnam, 2001), as related to the issue of variable public distrust in local and national government institutions (COSLA, 2014; Fitzgerald & Wolak, 2016), can constitute further hindrances to public participation initiated by local government agencies, notably as a result of austerity measures (Chorianopoulos & Tselepi, 2018; Deas & Doyle, 2013; Etherington & Jones, 2018; Lee & Kim, 2018). More generally, the complexity of the planning issue and lack of citizen interest can also limit public participation in cities (Ebdon, 2002). Views about the value and nature of public participation can also differ among citizens, elected officials and civil servants. In their empirical study of municipal budgeting in four cities in North Carolina, Berner, Amos, and Morse (2011) found that: i) elected officials tended to favour representative modes of local democracy at the expense of participatory modes of public participation, and were notably mindful of more vocal and activist segments of civil society; ii) civil servants were more inclined to consider participatory processes as enabling to educate citizens about complex urban budgeting processes; and iii) citizens viewed effective participation as characterised by extensive cooperation, interaction and continuous feedback and communication between city agencies and the public.

Although online technologies for public participation enable a wide range of engagement purposes, ranging from sharing of information to co-production and community self-organisation (Falco & Kleinhans, 2018b; Gün et al., 2019; Hasler et al., 2017), their use in spatial planning typically revolves around the 'consultation' rung on Arnstein's ladder (Desouza & Bhagwatwar, 2014; Kahila-Tani et al., 2019). The design space for some technologies can still be improved, such as for online participatory budgeting portals (Parra et al., 2017), or to improve the integration of platforms in spatial planning workflows (Gün et al., 2019; Kahila-Tani et al., 2016). Notwithstanding, the hurdles to the wider adoption and use of the full potential of participatory technologies seem institutional and organisational rather than technological (Anttiroiko, 2012a; Brown & Kyttä, 2014; Fung, 2015; Ganapati, 2011; Kahila-Tani, 2015; Nabatchi & Leighninger, 2015). Some technologies may also generate more trust in local government than others. Based on user interaction data with the Seoul metropolitan agency, Porumbescu (2016) found that greater use of local government websites by citizens was linked with reduced trust and satisfaction in local government, while greater use of social media platforms was associated with higher levels of trust and satisfaction.

More broadly, public participation initiated by city agencies is not necessarily democratic, particularly if motivated and underpinned by opaque local decision-making processes, or if articulated around rigid consensual approaches. The technical and political framing and staging of public participation may empty participation of any influence on planning processes, and may even silence the articulation of substantive planning alternatives (cf. Arnstein, 1969; Eräranta et al., 2015; Flyvbjerg, 2002; Radil & Anderson, 2018; Swyngedouw, 2005b). For example, MacLeod (2013) demonstrates that the use of design charrettes and other participatory techniques to inform a New Urbanist development in Scotland functioned as "mobile post-politics" to garner consensus. Consensus-seeking participatory technologies may thereby preclude substantive dialogue and foreclosed the formulation of planning alternatives. Perhaps unsurprisingly, the project met with significant local opposition at multiple stages of the planning process.

Organisational and institutional factors that may hinder progressive approaches to public participation include (Fung, 2006):

- Powerful factions and elites, as well as well-informed interest groups may dominate the deliberation process
- Institutions and external actors may strongly constrain the scope of deliberation (see also Allmendinger & Tewdwr-Jones, 2010; Swyngedouw, 2005a)
- Devolution of decision-making could lead to the segmentation of policy and political decision-making
- Successes in empowered deliberation initiatives may be difficult to sustain over time

Placing greater consideration on the complementary character between active citizen participation, professional expertise, and political representation could help overcome some of the above hindrances to participatory planning (Fung, 2006).

In all, the wide range institutional and organisational factors that affect participatory processes and the technologies that support them can transpire as inherently social and technical or 'hybrid'. Issues surrounding the representativeness of the diversity of both ontological and epistemological claims about urban environments remains ever unresolved in spatial planning, and points to the need for holistic, socio-technical approaches as inherently hybrid in nature.

3.6 Innovation in-the-making

The range of organisational and institutional factors presented in the chapter highlight both significant opportunities and challenges to innovations in participatory planning practices. This section focuses on learning processes at both the level of individual professionals and organisations. Toward this end, it draws on literature on organisational sociology, ICT innovation in government, and DPP innovation.

3.6.1 Forms and dynamics of organisational innovation

Throughout history, processes of innovation have denoted a wide range of sweeping technological, social, political and societal changes (Gaglio, Godin, & Pfotenhauer, 2017). In the modern era, Schumpeter's influential approach to innovation focused on entrepreneurship and was premised on creative destruction; it was also scant in its appreciation of end-user values. Building on Schumpeter, private sector approaches to innovation are ill-suited to the study of innovation in public service organisations (Hartley, 2005). Approaches to innovation have been diverse and definitions remain elusive (De Vries, Bekkers, & Tummers, 2016). Hartley (2005) identifies three competing paradigms to public sector innovation: 1) 'traditional' public administration that focuses on large-scale innovations but cannot cater for continuous improvements; 2) New Public Management innovation centred on process efficiency and customer value; and 3) networked governance that aims for transformational and continuous improvement to service delivery and engages with end-users as co-producers. A distinction can also be made between innovation and service improvements: i.e. whether innovation is adopted for its own sake or whether it is correlated with qualitative and/or quantitative increases in public value, for example public services that display greater fitness for purpose (Hartley, 2005).

Mulgan and Albury (2003, p. 3) define innovation in the public sector broadly as "new ideas that work":

> Successful innovation is the creation and implementation of new processes, products, services and methods of delivery which result in significant improvements in outcomes efficiency, effectiveness or quality.

Focusing on collaborative innovation, Sørensen and Torfing (2011, p. 849) define innovation in the public sector as :

> An intentional and proactive process that involves the generation and practical adoption and spread of new and creative ideas, which aim to produce a qualitative change in a specific context.

The latter definition stresses the purposive/intentional, creative, transformative and context-sensitive dimensions of innovation. Furthermore, the incurred change is not described as either positive or negative, based on the assumption that 'desirability lies in the eyes of the stakeholder' (Sørensen & Torfing, 2011, p. 850).

Due to its socio-technical nature, technological innovation can be conceived of as landscapes or regimes of innovation that comprise infrastructures, webs of actors and institutional environments (Joly, Rip, & Callon, 2010). Rather than centralised, innovation can be distributed or open, as exemplified by the development and dissemination of open source software. Joly et al. (2010) identify two broad regimes of innovation. The first is the so-called 'Regime of Economics of Technoscientific Promises', or technology-driven innovation. The latter banks on future technological, societal and profitable value, for which it relies on capital investment, innovation partnerships and intellectual property rights. The second is the 'Regime of Collective Experimentation', underpinned by collaboration, participation, and relative openness, and where technology may become more of a means than an end. Due to its greater involvement of civil society, collective experimentation may not necessarily lead to productive outputs. Interestingly, the two innovation regimes can compete or overlap with one another. Their most fundamental similarity lies in the fact that they both mobilise a multiplicity of stakeholders. Furthermore, innovation is a dynamic, contingent and iterative process: "innovation models are not unique and they are constantly reinvented by actors. There is no one single best way to innovate" (Joly et al., 2010, p. 30).

Based on a systematic review of 181 publications on public sector innovation published between 1990 and 2014, De Vries et al. (2016) identify four main types of public sector innovation: i) *process innovation*, characterised as either administrative or technological process innovation; ii) *product or service innovation*; iii) *governance innovation*; and iv) *conceptual innovation*. The main reviewed innovation goals include: increasing effectiveness and efficiency, tackling societal problems, increasing customer satisfaction, involving citizens, and involving private partners. Interestingly, 35% of studies did not mention any public sector innovation goal, and only 6% mentioned 'involving

citizens'.[13] The majority of investigated innovations concerned administrative processes, particularly those driven by New Public Management reforms.

Focusing on e-Government, Fath-Allah, Cheikhi, Al-Qutaish, and Idri (2014) review no less than 25 models of maturity. The influential United Nations Maturity Model comprises four successive stages to e-Government innovation: i) *emerging information* which provides one-way, static digital information to citizens); ii) *enhanced information services* which can provide two-way simple information flow; iii) *transactional services* characterised by two-way interaction with citizens; and iv) *connected services* underpinned by user-centred design, including Web 2.0 functionalities that enable to collect citizen feedback. The model adopts an incremental, step-wise approach that requires growing levels of capacity and material resources. Due to its focus on innovation efficiency, it can be applied to a wide range of organisational and institutional contexts (Bertot, Estevez, & Janowski, 2016; Fath-Allah et al., 2014).

Due to the disruptive and non-linear nature of innovation, however, Bertot et al. (2016, p. 214) provide an alternative sevenfold conceptualisation of innovation in digital public services, depending on the main focus of the innovation: i) *transparent* (i.e. open and accountable); ii) *participatory* (i.e. enabling crowdsourcing and interaction); iii) *anticipatory* (i.e. able to predict citizen needs through data and modelling); iv) *personalised* (i.e. customised to citizen needs and preferences); v) *co-created* (i.e. designed and developed through stakeholder collaboration or citizen empowerment); vi) *context-aware* (i.e. pervasive or ubiquitous distribution of services), and vii) *context-smart* (i.e. leveraging insight alongside services through such means as interoperability and Artificial Intelligence). Rather than incremental, the suggested dimensions are discrete, open, flexible and provide opportunities for complementarity. The framework is also open to further refinement and contextualisation, as well as cross-fertilisation and interdependencies between the different types of innovation. Likewise, Sørensen and Torfing (2011) outline four constitutive though non-linear phases to cycles of innovation: i) the generation and cross-fertilisation of ideas (e.g. articulation of problems and opportunities); ii) the selection of ideas worth pursuing; iii) the implementation of ideas into procedures, practices and services; and iv) the dissemination of new practices.

[13] My own analysis is that this figure either indicates that: i) the search keywords for the review were too narrow to account for all studies that dealt with citizen involvement; ii) citizen involvement has been understudied in the field of public sector innovation; iii) little innovation in citizen involvement has occurred in that period; and/or iv) academic research has been out of touch with actual processes of citizen involvement innovation in the public sector.

Innovation requires particular conditions. Bertot et al. (2016) highlight the following prerequisite conditions for innovative digital public services: ICT infrastructure; capacity; eco-systems of social innovation; partnerships with citizens, the third and private sectors; inclusion; shared value across all stakeholders; multiple channels; security; privacy; and secure and verifiable authentication. Mulgan and Albury (2003) argue for forms of public sector service provision that are adapted to user needs and adaptive in their capacity to integrate innovation. Where transformative impacts are sought in service provision, incremental innovations will require policy interventions to upscale them to a systemic scale. Considering innovation in the public sector more broadly, Mulgan and Albury (2003) identify motivation, opportunity and skills as the main enabling factors. They also identify barriers to innovation: a culture of risk aversion; adoption of technologies that constrain existing arrangements; the absence of incentives to innovate or adopt innovations; a lack of skills in risk or change management; short-term budgets and planning horizons ('short-termism'); short delivery timeframes and administrative burdens; and a lack of will to shut down failing programmes (combined with stringent standards for the uptake of new programmes). Sørensen and Torfing (2011) list the following barriers to collaborative innovation: *cultural* (e.g. 'zero-error' culture, paternalistic professional norms); *institutional* (e.g. large gap between politics and administration), *inter-organisational* (e.g. bureaucratic silos, groupthink); *organisational* (e.g. lack of support for innovation); *identity-related* (e.g. from key stakeholders). De Vries et al. (2016) list a range of *antecedents* or pre-conditions to public sector innovation: environmental, organisational, innovation characteristics, and individual.

Based on a large-scale survey of English local authority chief executives about best practice in urban regeneration and community safety policies, Brannan, Durose, John, and Wolman (2008) indicate the following sources of innovative ideas among organisations: the presence of young, experienced staff; information about regeneration programmes at other local authorities; the availability of best/good practice guides; local government newsletters; and interaction with experts (e.g. researchers, consultants) and other organisations. Organisations can also be classified based on their level of innovation adoption. Mulgan and Albury (2003) identify five categories of organisations: first movers/pioneers, early adopters, followers, laggards and resisters.

Beyond lists of drivers and barriers, the literature also provides research frameworks. De Vries et al. (2016, p. 162) provide a heuristic framework of public sector innovation comprising of antecedents, innovation types, and innovation outcomes. In a similar vein, Sørensen and Torfing (2011, p. 859) provide a model for a systematic and comprehensive investigation of collaborative innovation in the public sector that focuses on the identification of key institutional drivers and barriers, dynamics of collaborative innovation processes and their innovation outputs in terms of policy, organisation, and services, and how these are influenced by various governance and more general conditions.

3.6.2 Innovation as learning through practice and translation

Membership to a community of practice is a foundational component of social learning (Wenger, 1999). The learning component of digital participation can be conceptualised in different ways. First, a distinction applies to processes of *acculturation* and *enculturation* as distinct, though potentially complementary, modes of learning (Haunschild & Chandler, 2008).[14] *Acculturation* denotes adaptation of individuals to a mainstream culture. As DPP adoption by planning organisations seems to have been growing exponentially over the past five years, first-time adopters may be keen to join national and/or international communities of practice. Expert conferences, seminars, webinars, and software meta-communities constitute some of the main channels for such communities of practice to convene collectively. These can in turn generate or arise from peer-to-peer learning among practitioners. Acculturation can concern individual practitioners, sub-sets of individuals or several departments within an organisation. *Enculturation*, on the other hand, denotes adaptation of cultural practices to a new cultural setting. Practically, this would translate as adapting former experience or experience acquired through acculturation to novel situations.

As learning accrues over time, concurrent changes in knowledge and practices occurs. These changes may occur endogenously (i.e. within the organisation, through the agency of employees) and/or exogenously (i.e. from outside the organisation, such as through hired staff or adaptation of practices from other organisations) (Haunschild & Chandler, 2008). In turn, changes in practices at the individual and group level within the organisation can lead to institutional change both within and across organisations. The adoption of new ideas for innovation can be both exogenous and endogenous. Based on large scale survey of English local authorities, Brannan et al. (2008) find that sources of innovative ideas originated primarily from internal staff and partnership organisations, followed by informal and formal contacts at other local authorities and best practice guidance from professional associations and government. Due to context dependency across different organisations, Mulgan and Albury (2003, p. 27) warn against the risk of adopting wholesale best-practice recommendations or solution packages:

> Even on the basis of robust evidence, standardisation reduces the ability of services and systems to innovate to meet future unforeseen and unforeseeable circumstances. A level of diversity is necessary for robustness against the future.

[14] See for example the respective definitions for enculturation and acculturation on lexico.com: https://www.lexico.com/en/definition/acculturation and https://www.lexico.com/en/definition/enculturation

Brannan et al. (2008) found that English local authorities' main difficulties relative to best practice were assessing whether best practice was relevant for local implementation or adaptation, judging whether best practice actually is 'best' practice, and identifying what best practice actually is. Accordingly, the vast majority of surveyed local authorities viewed best practice guides as 'somewhat useful'.

To provide empirical richness and grounding about organisational processes of innovation, learning and experience dissemination, one needs to consider the day-to-day experience of community engagement practitioners. Escobar (2011, p. 1) provides a rationale for considering engagement practitioners' perspective:

> Participatory democracy is undergoing processes of institutionalisation and professionalization all around the world. Yet, we know surprisingly little about those professionals in charge of translating its democratic ideals into practices […]. The engagers inhabit the relational space of local participatory policy making. They negotiate its boundaries, speak and translate its many languages, and render it operational. They are a nodal point in most local processes, as well as a portal to their different dimensions and inhabitants. The pragmatics of citizen participation and deliberation are the engagers' bread and butter.

Engagement practitioners involve all manners of stakeholders: elected officials, council staff, various citizen groups and individuals, civil society organisations, and actors from the private and third sector. Escobar (2017, p. 2) distinguishes between public participation professionals in the public sector and those in the private and third sectors, as the former "have the status and working conditions of public servants, their operational context is public administration, and they must navigate the institutional politics of policymaking." Engagement practice entails significant translation of both experience from other organisations and intra-organisational strategies. Translating objectives and others' experience into practice also entails interpretation, grounded in know-how, and possibly also practical discretion, in order to create an effective bridge between citizens and local government policy-making (Escobar, 2011). As the practice of citizen participation often releases more tension than consensus, Forester (2006) recommends engagement practitioners to hone in on mediation skills to help move adversarial stakeholder groups to jointly identify solutions. While useful skills, dialogue facilitation and debate moderation may in fact accentuate the entrenchment of positions among competing participants. Due to the inherently political nature of their work, practitioners also need to engage with power and the related risks of misinformation (or 'post-truth' manipulation of evidence) and populist discourses. Various practical recommendations are available for collaborative planners and engagement professionals to strive to engage communities constructively and leverage evidence-based planning (see Escobar, 2014; Forester, 1982, 2006, 2013; Rivero, 2017; Sager, 2019).

The positionality and status of practitioners also matters. In their survey of over 90 community planning professionals across Scotland, Escobar, Kandlik Eltanani, Gibb, and Weakley (2018) reveal

that engagement practitioners often do not belong to a clear institutional space within local authorities and also run counter to silo-thinking and distribution of roles within the organisation. Despite a growing professionalization, the surveyed professionals display varied levels of engagement, communication and management skills. The majority report having learned their skills 'on the job', or in continuation of similar former professional capacities. Practical challenges to community engagement include: engaging with the 'usual suspects' or most vocal members from the community; consultation fatigue and related inability of local authorities to provide feedback about how former consultations influenced decisions; lack of community understanding about the role of community planning; and lack of public trust that citizen input will be used in decisions. The shortage of resources dictated by austerity regimes in local government restrict the scope and extent of engagement activities. It also leaves the impression on participants that involving communities in policy-making and delivery is a means of saving money for local authorities, which places engagement professionals in an awkward position. Practitioners perceive themselves as 'activists'. However, they face substantial organisational and institutional hindrances to their role of fostering collaboration across organisational and policy boundaries, facilitating deliberation and bridging policy and practice-based forms of evidence.

3.7 Bridging lay and expert knowledge and agency

At the core of digital participatory technologies is the aim of improving communication and dialogue between citizens and local government. Active forms of public participation also presuppose that knowledge and values in spatial planning can be co-produced between lay citizens and expert professionals through a variety of participatory mechanisms (Nabatchi, 2012; Nabatchi & Leighninger, 2015). Participatory technologies enable to bridge the gap between lay and professional knowledge so as to inform more inclusive and transparent spatial planning and decision-making processes (Kahila & Kyttä, 2009; Rantanen & Kahila, 2009). The recognition of the value of citizen knowledge in planning practice mirrors the intellectual history of participatory planning theory.[15] A noteworthy influence includes Wildavsky's (2007 [1979]) seminal book *Speaking Truth to Power*, with a whole chapter dedicated to 'citizen analysts' that provides important common sense guidance as well as moral incentives for engaging citizens in policy analysis.

3.7.1 Crowdsourcing

[15] See the sections in the first part of the literature review.

A key component of digital participatory approaches is the notion of "crowdsourcing", or collecting ideas, views, suggestions from a mass of citizens to shape spatial planning (Atzmanstorfer & Blaschke, 2013; Brabham, 2009; Hosio, Goncalves, Kostakos, & Riekki, 2015; Mueller, Lu, Chirkin, Klein, & Schmitt, 2018; Nummi, 2018; Silva, 2013), which notion differs slightly with the initial industry-based popularisation of the concept by John Howe (2006). Brabham (2013) identifies three rationales for conducting crowdsourcing in government: i) when an organization wants to delegate the performance of a task; ii) an online community volunteers to perform the task; and iii) the outcome benefits both the organisation and the online community. Brabham (2013) also identifies four ideal planning situations that lend themselves to crowdsourcing: 1) knowledge discovery and management, with such typical tasks as reporting problems; 2) tasking crowds to analyse large amounts of information that require human intelligence; 3) tasking crowds to solve empirical problems, for example through evidence-based ideation; and 4) tasking with creating and selecting creative ideas.

In practice, crowdsourcing through digital participation seems to favour the communication of problems and creative ideation, as well as for purely informational purposes (Desouza & Bhagwatwar, 2014; Ertiö, 2015; Gün et al., 2019; Seltzer & Mahmoudi, 2013). Analysing the use of Civic Tech by local government and citizen groups through hackathons and related participatory app-making public events, Boehner and DiSalvo (2016) identify three complementary components that support the production of meaningful data, which they term "data-design triad": i) curiosities, which entails asking questions about urban situations or datasets; ii) problem-solving, expressed as "putting out fires", essentially through problem-reporting "311" service apps; and iii) making use of existing or emerging opportunities, or "moving forward the needle", featuring such applications as public budget exploration and voting platforms.

Epistemologically, a crowdsourcing approach presupposes a post-positivist or social-constructionist knowledge paradigm that can complement expert, technical knowledge. Regarding map-based digital participatory technologies such as PPGIS and 3D participatory platforms, this entails moving from a strictly GIS-based quantitative approach to mapping, to also include more experiential and attitudinal data produced by citizens (Billger et al., 2016; Huck, Whyatt, & Coulton, 2014; Kahila & Kyttä, 2009), for example in the form of crowdsourced emotional or perceptual maps (Jiří Pánek, 2016; Jiři Pánek, 2018), or "softGIS" methodologies that seek to integrate citizen-contributed attitudinal data with expert, "hard" geographic data and advanced spatial analyses (Kahila & Kyttä, 2009). As a concrete translation of communicative planning orientations, digital public participation hinges on the recognition of citizen knowledge as experiential expertise and its inherent value in public dialogue and its potential contribution to all stages of urban policy making, from early design stages to post-hoc evaluations (Kahila-Tani, 2015).

Notwithstanding the above, a clear conceptual distinction needs to be made between passive and active forms of crowdsourcing. Passive crowdsourcing of citizen data occurs through sensors and the reporting of problems in the built environment by citizens, and other volunteering of various geographic information grounded in the notion of the "citizen as sensor" (see Goodchild, 2007). In contrast, active/interactive forms of public participation can sustain effective co-production (Ertiö, 2015; Seltzer & Mahmoudi, 2013).

3.7.2 Co-production

Linked to the idea of crowdsourcing, Ostrom (1996, p. 1073) can be credited for popularising the use of the term 'co-production' in research, denoting a joint-delivery of *services* rather than simply knowledge: "By co-production, I mean the process through which inputs used to produce a good or service are contributed by individuals who are not 'in' the same organization." This entails a conception of citizens as active stakeholders rather than passive consumers or beneficiaries: "Coproduction implies that citizens can play an active role in producing public goods and services of consequence to them." This service co-delivery approach has also been advocated for strategic spatial planning (Albrechts, 2013). Reviews of a wide variety of digital participatory technologies highlight a range of possibilities in terms of the co-production of ideas and urban policies as well as service delivery (Falco & Kleinhans, 2018b; Gün et al., 2019; Hanzl, 2007), for example in the case of participatory budgeting that have the potential to facilitate high levels of citizen involvement and collaboration with local authorities (Gilman, 2016; Parra et al., 2017; Zafeiropoulou et al., 2015), or in terms of reporting problems in the environment (Ertiö, 2015; Hasler et al., 2017). Hence, digital participatory technologies can help create relationships characterised by shared knowledge and interaction between citizens and city agencies as part of participatory urban planning processes.

As a means of enmeshing local contextual dynamics and aspirations in planning, the notions of "co-production" and "reflexivity" have been mobilised in different ways (cf. Albrechts, 2013; Fischer, 2000). A co-productive approach stands as politically radical because challenging existing institutional practices, for example in strategic spatial planning (Albrechts, 2013, 58):

> As coproduction requires a change to the status quo, with its introduction the world of planning and planners inevitably becomes more complicated and messy. However, it is in making planning issues and approaches messy that transformative practices can take place.

As with the notion of public participation[16], the notion of co-production also suffers from a lack of systematic or agreed definitions (Watson, 2014). The resulting ambiguity in understandings of co-

[16] See the first part of the literature review dealing with competing public participation models.

production reveals three important internal contradictions, pitching: 1) the *institutionalisation* of co-production by government agencies versus its enduring *flexibility* as an innovative practice; 2) *cooperation* versus *conflict*, as inherent opposing dynamics in participatory and shared decision-making processes; and 3) *processes* versus *outputs*, as co-production often emphasises greater participation but often fails short of revealing benefits in terms of tangible outcomes (Galuszka, 2019). At the same time, other authors highlight the need to consider *both* outcomes *and* processes as enabling the greater institutionalisation of co-production practices over time, and the related need to work with the inherent tensions between consensus and difference, which can both be associated with the slowness of institutional and social changes associated with social learning through participatory processes (cf. Davis & Andrew, 2018; Healey, 2012; Innes & Booher, 2010; Kahila-Tani, 2015). Further distinctions can be made between 'co-production' and 'collaboration', as co-production can entail more participatory, flexible and 'thicker' (Nabatchi & Leighninger, 2015) forms of citizen involvement, including aspects of community self-mobilisation, as compared to more mainstream forms of collaborative planning (Watson, 2014).

3.7.3 Citizen roles and digital consumption technologies

The relevance of contributions by citizens can also be framed in terms of the role ascribed to citizens by local government agencies. Agger and Lund (2017) identify three types of interactions between public sector and citizens associated with specific citizen roles: i) citizens as *clients* or *political constituents,* and a commonly expressed obligation for elected officials to meet the expectations of their constituencies, which may or may not match actual political realities ; ii) citizens as *customers*, as motivated by New Public Management approaches and related individualistic, preference-based conceptions of public service design and delivery; and iii) citizens as *co-producers* and *co-creators*, where citizens are actively mobilised in policy-making and implementation. Agger and Lund (2017) indicate that three citizen roles can co-exist, with client-centred approaches contributing the least to active policy-design and implementation. They further break down the role of citizens as co-innovators as three potentially complementary sub-roles: i) *co-implementers*; ii) *co-designers*; and iii) *co-initiators*. Each lends itself to differing modes of social innovation in the public sector. They also observe that although the public sector is increasingly making use of citizens as co-initiators and co-creators, there remains potential for much greater innovation in the design and delivery of public services in local government, including urban planning. Citizens may act as initiators rather than sheer participants where participatory processes are led by citizens, as opposed to conventional modes of citizen participation initiated by city agencies (Afzalan et al., 2017; Ertiö & Bhagwatwar, 2017; Falco, 2016; Møller & Olafsson, 2018). However, there seem to be inherent discrepancies and tensions between citizen-led and government-led participatory processes, as the former lacks legal weight and could be perceived as contesting logics of representative local democracy (Radil & Anderson, 2018).

Interrelated consumption and political practices typically underpin the everyday life of citizens, which may also affect citizens' ability to engage civically (S. Coleman & Gøtze, 2001; Putnam, 2001). Schudson (2006, pp. 202-203) thereby considers the very dichotomy between citizens as consumers and (political) citizens necessary yet simultaneously problematic, arguing that:

> We will not enhance the value of public affairs by positing the moral weakness of consuming. Better, I think, to find strategic opportunity in consuming to enlarge the points of entry to political life and to underline the political dimensions of our world with cases in point.

As digital participatory technologies typically make use of the aesthetics and functionalities of existing digital consumer technologies such as Google Maps and social media platforms such as Facebook (see for example Falco & Kleinhans, 2018b; Gün et al., 2019), indeed a narrow conceptualisation of citizens as either consumers or political constituents can seem unnecessarily arbitrary Schudson (2006, 204). Transposed to digital participation in urban planning, one can acknowledge citizen participation as political or civic action, although not necessarily militant or activist action, by means of what are essentially augmented (i.e. civically adapted) digital consumer technologies (Douay & Prévot, 2015). Urban residents' use and expressed preferences for urban amenities may be at once civic and consumption-based and difficult to disentangle, for example regarding land use preferences, perceptions of urban safety, child-friendliness of the built environment, accessibility to green space and overall perceptions of well-being (cf. Broberg, Kyttä, & Fagerholm, 2013; Brown & Raymond, 2014; Czepkiewicz, Jankowski, & Młodkowski, 2016; Fagerholm et al., 2016; Kyttä, Broberg, Haybatollahi, & Schmidt-Thomé, 2016; Jiři Pánek, 2018). Civics and consumption practices may therefore be seen to blend in the interrelated uses of digital participatory technologies and physical urban spaces in such varied technologies as *online mapping* (Haklay et al., 2018; Rzeszewski & Kotus, 2019), *Augmented Reality (AR)* (Cirulis & Brigmanis, 2013; Olszewski et al., 2017; Portman et al., 2015), *Virtual Reality* (I. D. Bishop, 2011; Marcus Foth, Bajracharya, Brown, & Hearn, 2009; Gordon & Koo, 2008), *gamification* (Klamert & Münster, 2017; Leorke, 2019; Mather & Robinson, 2016; T. K. Nielsen et al., 2016; Westerberg, 2014), and *location-based services, tools and social media* (Afzalan & Muller, 2018; I. D. Bishop, 2015; Desouza & Bhagwatwar, 2012; Evans-Cowley, 2016; Evans-Cowley & Kubinski, 2015).

As technological innovations increasingly pervade society alongside e-Government by default and emerging Planning 2.0 practices, digital literacy increasingly becomes a prerequisite for effective citizen participation. Mäkinen (2006) articulates digital literacy as the basis for a long-term spiral of empowerment, giving citizens access to various forms of valuable information, discussion and information-sharing forums, channels for public participation and the expression of personal or community views. Based on a literature review, Mäkinen (2006, p. 392) suggests the following incremental factors to support citizen participation and empowerment: acquiring technical skills,

social networks, the capacity to receive and produce information, developing courses of action, developing competence, participation, influence and choice-making, with an end result of greater control over life. Likewise, Mihailidis and Thevenin (2013) point out the increasing importance of digital media literacy as a core competency for effective citizen participation or "engaged citizenship" in all manners of local affairs. In a similar manner, Roche (2014) argues that smart cities can only be enabled through digitally- and spatially literate citizens and professionals. Mihailidis and Thevenin (2013) specify three types or complementary characteristics of media literate citizens: i) *critical thinkers*; ii) *creators and communicators*; and iii) *agents of social change*. Critical thinking is a necessary skill for digital media literate citizens to process and judge the quality of large amounts of information upon which to base their participation, which echoes with Wildavsky's (2007 [1979]) discussion of the institutional requirements for considering 'citizens as analysts', and the related skills which citizens should develop. Media literate citizens can also be effective creators, not simply passive consumers of media technologies, or "produsers" (i.e. producers *and* users) of such varied digital content as consumption-entertainment and geographic data (Bird, 2011; D. Coleman, Georgiadou, & Labonte, 2009). While emerging, the reality of 'produse' (i.e. productive use of digital media through creation of digital content) remains marginal, as both consumption media, crowdsourced knowledge (e.g. wikis such as Wikipedia) and online geographic data (e.g. OpenStreetMap) remain the preserve of a minority of expert or passionate individuals (M. Graham, Hogan, Straumann, & Medhat, 2014; Haklay & Weber, 2008; Robertson & Feick, 2016). Related to the other two roles, media literate citizens can act as agents of social change, for example in the context of civically engaged education in schools or higher education (Mihailidis & Thevenin, 2013). These three alternate or complementary roles enable to apply four key digital media literacy sets of competencies: *participatory*, *collaborative*, *expressive* and *critical competencies*, which citizens acquire through training and practice, and constitute a basis for any subsequent notion of empowerment. Education and learning about civic processes concerns both citizens and city officials, particularly in more technical and labour-intensive mechanisms such as participatory budgeting (Cabannes & Lipietz, 2018; Parra et al., 2017).

Building on the work by Schudson and Ethan Zuckerman, Graeff (2014) further distinguishes between *monitorial citizenship* and *effective citizenship*. Monitorial citizenship occurs where citizens gather information about problems on their urban environment and nudge local government to provide concrete solutions. Contrary to other authors who see reporting applications (e.g. SeeClickFix; FixMyStreet) as low-level participation characterised by one-way communication and limited overall influence on planning processes and decisions (Desouza & Bhagwatwar, 2014; Ertiö, 2015; Møller & Olafsson, 2018), Graeff (2014, 2018) views it as empowering because leading to tangible effective changes in the built environment, while at the same time recognising the need to "make all apps more

civic, not just more civic apps" (2014, p. 32). Citizen roles in participatory processes may further be understood as either 'explicit' (active) or 'complicit' (passive) (e.g. Ertiö, 2015). Passive participation occurs through sensing apps on mobile device, which directly or indirectly record data about users' consumption practices, attitudinal views or mobility patterns, or as extracted from big data collected by technology providers in pursuit of smart(er) cities. Such passive or 'less-than-active' modes of citizen participation present risks in terms of democratic governance, among which privacy issues and limited citizen influence on urban planning & management processes (Castelnovo et al., 2016; Kitchin, 2014; Viitanen & Kingston, 2014).

Finally, digital participatory platforms require secure and user-friendly technical systems to function, as do the widespread digital consumption technologies upon which they build, alongside other e-Government services (Narooie, 2014). Attendant to system robustness are issues of data privacy, protection and ownership and related technocratic governance issues discussed above, which can influence citizens' and organisations' trust in and willingness to adopt ICTs for citizen participation (Marzouki, Mellouli, & Daniel, 2017).

3.7.4 Social learning

Besides requiring preliminary skills, engagement *with* and *through* digital participatory technologies correlate with levels of social and cultural capital among citizens, particularly as regards complex planning situations. In a nutshell, social and cultural capital can be conceptualised as the confluence of both individual and social evolutions, whereby individuals' tastes, preferences and behaviour emerge as the dual product of personal experiences and interaction with particular community groups (Bourdieu, 1979). Due to its recursive determinant and determined nature, social capital is simultaneously enabling and entrapping (e.g. Willis, 2017 [1977]). The salience of socio-cultural capital in public participation can be addressed through social learning and a related appreciation of long-term *processes*, rather than considering the effectiveness of participatory processes exclusively in the light of immediate *outcomes*, such as modified plans, projects and policies. As discussed above, the capacity for citizens to engage effectively may need to develop over time before yielding meaningful or desirable outcomes. Wildavsky highlights the long-term, incremental nature of building social capital for citizen participation, and the related slowness of change in organisational procedures (2007 [1979], 277):

> That most things will remain the same at any time is not incompatible with some things changing some of the time. Radical change… can result from the rapid accumulation of more modest changes. The quality of these changes, not their sheer quantity, depends on whether the interpersonal relationships of people engaged in these programs discourage or encourage citizens in daily life to act as analysts, furthering their moral development.

Hence, bridging the gap between lay and expert knowledge requires raising both social learning and organisational/institutional capacity over time. In the long-run, citizen participation can improve

citizen capacity and autonomy through learning, raise human dignity through reciprocity and sharing, and help to steer inevitable changes in societal needs and policy-making in more collectively desirable trajectories (Wildavsky, 2007 [1979]). This dimension of incremental social learning over time also points to theories of small incremental social and institutional changes occurring alongside each other, for example through structuration processes (Giddens, 1984).

More generally, social learning can be characterised as single, double or triple loop learning. Planning problems such as climate change resilience that are highly complex or unstructured in nature, and for which the expert knowledge evidence base is contentious or incomplete, would normally require higher levels of social learning (Hurlbert & Gupta, 2015).

A social learning approach entails being clear as to '*who'* learns '*what'* about '*what'*, and to be attentive to both positive and negative outcomes of fostering social learning in planning. With a focus on urban planning, von Schönfeld, Tan, Wiekens, and Janssen-Jansen (2019) review uses of social learning in different academic fields, including: planning practice and research, environmental governance, organisational studies and psychology. Each field privileges a particular unit of analysis, ranging from the individual and groups (e.g. psychology) to society (e.g. environmental governance). Based on the investigation of a temporary brownfield redevelopment initiative, the authors articulate their analysis of social learning in terms of participant roles, personal and group dynamics, and various outcomes (i.e. physical, behavioural and policy-related).

The reality of social learning can be messy, however. Approaches to social learning embedded in communicative planning[17], like the theoretical concept of the 'citizen', suffer from idealised assumptions. Based on the investigation of a multi-stakeholder representative forum in rural planning in the Netherlands, Turnhout et al. (2010) highlight that the practice of public participation itself creates civically-minded citizens, albeit sometimes in unpredictable ways. The contentious and situational nature of public participation dynamics may challenge claims to transparent citizen representation as well as the very purpose of public participation exercises. The multiplicity of identities mobilised by citizens in a participatory process can also reveal the performative and relational nature of participation. Based on three urban planning cases in Christchurch, New Zealand, Hayward (2000) highlights the fault lines in consensus-based approaches to public deliberation, and suggests five criteria to help improve social learning in practice: i) clear rules about the conduct of deliberation, and constitutional protection of community members and their property; ii) combining face-to-face discussions with other participatory activities; iii) the presence of third party facilitators;

[17] See the state-of-the-art about urban governance.

iv) transmission of and follow-up on deliberative outcomes to government and the wider community; and v) transparency of the deliberative and decision-making processes. Other authors have also made the case to improve participatory planning practice through learning, so as to improve organisational capacity over time for greater collaboration between planning experts and citizens (Forester, 2012; Healey, 2012; Innes & Booher, 2010). The main challenges related to including citizens' experiential knowledge in planning relate to the institutional hindrances discussed above. Opportunities lie in the emerging technological affordances (Ertiö, 2015; Hasler et al., 2017), as well as the aforementioned potentialities of innovations and experimentations in Planning 2.0 practices.

3.8 Thematic classifications of socio-technical factors

The literature provides a range of classifications of socio-technical factors that affect the use of DPPs in urban planning. These are presented below.

Afzalan and Muller (2018) identify four main themes and sets of recommendations in the literature: 1) inclusive planning; 2) consensus building as part of communicative-deliberative approaches; 3) learning from local knowledge; and 4) mobilising community action. Additionally, Afzalan et al. (2017) suggest five thematic clusters for the selection and use of online participatory technologies (OPTs): organisation capacity, community capacity, planning problem and participation goals, norms and regulations, and tool capacity. Organisation capacity denotes the management and control of the OPT, the type of organisation, planners' behaviour and attitude (including engagement skills), organisational collaboration, and tool incorporation within planning workflows and systems. Community capacity encompasses communities' level of experience with using OPTs, their socio-economic background, general attitude toward participation, and availability of digital infrastructure. Planning problems and participation goals respectively denote desired outcomes or objectives for engaging communities on the one hand, and the contextual specificities of planning projects. Norms and regulations include statutory regulations regarding public participation and data privacy, as well as communities' own norms and expectations about the role of public participation in planning. Finally, tool capacity relates to the features of the OPTs, including: the type of decisions, leadership (i.e. top-down versus community-led) and monitoring of participation which the tool enables; its efficiency in generating useful local knowledge and consensus; its capacity for facilitating conflict management and dialogue; and the overall user experience or 'atmosphere' of interaction. Additional issues not fully investigated in their review include ethical considerations about OPTs.

In their review of 35 civic tech for social innovation, Saldivar et al. (2018) focus on the levels of engagement that the technologies support and the benefits these bring to spatial planning. They provide a simple systematic framework to benchmark the evaluation of civic tech applications. In their review of 25 ICT-based platforms used in European cities, Gün et al. (2019) focus on their

design empowerment component, functional affordances and deployment in urban planning. They also provide a mind map of key factors that affect the use of ICT-based platforms in urban planning. These factors include user experience, trust in local government and technology, the geographical scale of the ICT-based public participation projects, user characteristics, representativeness of participation, and desired outcomes and goals for ICT-based public participation.

Falco and Kleinhans (2018a) provide a concise overview of the challenges for the use of digital platforms in local government, articulated in terms of contextual, technological and organisational factors. They articulate contextual factors in terms of: internet accessibility and digital divides, and related institutional issues pertaining to accessibility, data protection and privacy. Technological factors include the contrasting pace of technology development and innovation in local government, and the related issues of government and citizen data management. Organisational factors relate to the design of participatory processes, intra-organisational cultures of participation (or absence thereof) and availability of human resources, including the capacity to hire experts or trained staff.

Marzouki, Mellouli, et al. (2017) identify 6 main thematic clusters of factors in the literature on ICTs for citizen participation: i) ethical issues; ii) efficiency and cost-effectiveness issues; iii) political issues; iv) quality issues; v) citizens' issues; and vi) technology issues. Ethical issues comprise of transparency, trust, openness and information quality. Efficiency and cost-effectiveness relate to the affordability and task optimisation of participatory ICTs for client organisations. Political issues denote power relations, legitimacy, economic divide, and conflicts of interest. Quality issues pertain to local authorities' misunderstandings of citizens' lived problems at hand, and the need for in-depth evaluations of participatory processes, including metrics. Citizens' issues denote involvement, influence and the degree to which participation relates to citizens' living context. Technology issues relate to an overemphasis on technology as an end rather than a means to public participation, the digital divide, and the related need for participatory ICTs that address all the issues mentioned above in the best possible manner. Stressing the need to address interdependencies between these clusters of issues, Marzouki, Mellouli, et al. (2017, p. 211) indicate that "one of the factors leading to the complexity of public participation implementation could be its multidisciplinary nature." Multidisciplinarity necessarily evades the silo thinking that can plague many organisations.

3.9 Overviews of key socio-technical factors

This section provides tabular and diagrammatic overviews of all the aforementioned socio-technical factors.

Table 1 (displayed in 4 continuous parts) structures these factors in table form as opportunities and challenges. The table highlights particularly that the existing literature takes stock of a wide range of

technological, organisational and institutional factors that influence the use of DPPs in urban planning.

Table 1- Thematic opportunities and challenges for the use of DPPs in urban planning, as based on the literature (1/4)

Factors	Opportunities	Challenges	Related themes	References
Staff availability & skills	User-friendly administration of platforms; Project administration does not require coding skills	Integration of citizen input data into planners' workflows; Analysis of citizen input; Extra workloads; PP skills & expertise	Workflows & processes	Falco & Kleinhans 2018a; Gün et al. 2019; Czepkiewicz et al. 2018; Slotterback 2011; Parra et al. 2017; Kahila-Tani et al. 2016
Trained community engagement staff w/in the organisation	Use of DPP benefits from hiring staff with community engagement expertise	Limited resources to hire adequate staff	Workflows & processes	Afzalan & Muller 2018; Falco & Kleinhans 2018a
Public participation strategies & implementation procedures	DPPs as user-friendly Planning Support Systems; Research-based best practice guidance	Need to clearly specify which publics should be involved and why; Clarity & effectiveness of PP process design;	PP design Workflows & processes	Falco & Kleinhans 2018a; Afzalan et al. 2017; Aitken 2014; Walker & Rinner 2013; Kahila-Tani 2015; Brown & Kyttä 2014; Kahila-Tani et al. 2019
Matching PP goals, DPP design & capabilities of participants	Increasingly interactivity & design empowerment on DPPs	Trade-offs b/w depth of interaction & volumes of participation	DPP features Breadth & depth of PP PP design	Gün et al. 2019; Hasler et al. 2017; Gottwald et al. 2016
Cost-effectiveness	Cost of digital participation generally lower, relative to volume of participation	Not all planning organisation can afford to procure or develop digital tools; More efforts required to integrate DPPs in workflows	Workflows & processes DPP adoption	Falco & Kleinhans 2018a, 2018b; Czepkiewicz et al. 2018; Kahila-Tani et al. 2019; Slotterback 2011
Institutional focus of DPPs	Citizen-led and government-led DPPs can increase volumes and types of participation in planning, and share knowledge b/w planners & citizens	Tensions b/w participatory local democracy, community self-mobilisation & post-political condition	Workflows & processes DPP adoption Influence on planning	Desouza & Bhagwatwar 2014; Ertiö & Bhagwatwar 2017; Radil & Anderson 2018; Falco & Kleinhans 2018b; Jones et al. 2015
Intra-organisational culture & attitudes toward online participation	Planners' attitudes are increasingly favourable toward online participation	Enduring resistance to adopt participatory technologies; Insufficient capacity; Red tape; Inadapted workflows & processes	Workflows & processes DPP adoption	Slotterback 2011; Kahila-Tani et al. 2019; Brown & Kyttä 2014
Exploring innovative uses of DPPs	Potential for iterative DPP use, in synergy w/ in-person participation	Resistance to PP innovation & limited resources to explore new uses of DPPs	Workflows & processes	Brown & Kyttä 2014; Kahila-Tani 2015; Kahila-Tani et al. 2019; Parra et al. 2017; Cabannes & Lipietz 2017; Gün et al. 2019
Legal context & statutory consultation requirements	Legal contexts allow for voluntary participatory digital participation in excess of statutory requirements	Statutory consultation requirements often weak; Red tape may hinder adoption of digital platforms by local government	Workflows & processes	Bakowska-Waldmann et al. 2018; Kahila-Tani et al. 2019; Brown & Kyttä 2014; Afzalan et al. 2017
Distribution & understanding of roles & needs b/w planners & citizens	Citizens can be involved at all stages of planning processes and for wide variety of purposes and tasks	Distribution of roles & authority b/w planners & citizens sometimes fuzzy/unclear, which can lead to burnout or disengagement; Mutual misunderstandings of planners' & citizens' needs	Workflows & processes Breadth & depth of PP PP design	Haklay et al. 2018; Parra et al. 2017; Gün et al. 2019; Falco & Kleinhans 2018b; Kahila & Kyttä 2009; Brabham 2009; Marzouki et al. 2017; Hasler et al. 2017; Møller & Olafsson 2018;
Quality of background data provided by planning organisations	Digital platforms can be particularly effective at communicating background	Risk of overloading participants with background information	PP design	Falco & Kleinhans 2018a; Møller & Olafsson 2018; Hasler et al. 2017
Conflict mediation & management	Early use in planning enables to identify & can prevent conflicts b/w stakeholders & land use preferences	The positive technological framing of citizen contributions may preempt conflicts & contestation	DPP Features PP design	Kahila-Tani et al. 2016; Brown & Raymond 2014; Douay & Prévot 2015

Table 1 - Thematic opportunities and challenges for the use of DPPs in urban planning, as based on the literature (2/4)

Factors	Opportunities	Challenges	Related themes	References
Moderation & monitoring of comments	Online participation can help identify conflicts early on in a planning process	Noise' (i.e. irrelevant contributions) & conflict in citizen comments & discussions	DPP features Breadth & depth of PP PP design	Afzalan & Muller 2018; Kahila-Tani et al. 2016; Brabham 2009
Crowdsourcing of planning solutions from the public	Digital technologies enable to crowdsource wide range of planning issues	Beyond one-way information flow & survey approaches, relatively few platforms are used to crowdsource planning solutions	PP design	Seltzer & Mahmoudi 2012; Ertiö 2015; Hasler et al. 2017; Brabham 2009; Falco & Kleinhans 2018b
Citizens' interest about public participation	Easy-to-use platforms enable citizens to participate effectively; Citizens as experts of their living environment	Civic participation must compete w/ other activities for citizens' time; Democratic deficits & declining interest in civic matters	Breadth & depth of PP	Seltzer & Mahmoudi 2012; Brown & Kyttä 2014; Marzouki et al. 2017; Kyttä & Kahila 2009
Variability of citizen input over time & space.	Online tools can provide real-time data and information from citizens	Dynamic data collection is required to monitor changes in citizen views & environmental quality; Spatial variations in citizen views	Breadth & depth of PP Influence on planning	Møller & Olafsson 2018; Brown & Raymond 2014
Citizens' contextual use of DPPs	DPPs' flexibility and accessibility can facilitate simple participation in a variety of use contexts (e.g. on-site, at home)	Knowledge gap about how and why citizens participate through DPPs, including factors for non-participation; vocal citizens may dominate input on the DPP	Breadth and depth of PP	Marzouki et al. 2017; Douay & Prévot 2015; Gottwald et al. 2016; Firmino 2003; Marzouki et al. 2017
Inclusion of people and views	Greater number and diversity of participants (e.g. parents, youth, young adults) than traditional methods; Individualised participation	Digital divide; Variablility of participation per context; Exclusion of social movements; Sampling can affect quality of contributions & ensuing decisions; Breadthvs. depth of participation	Breadth & depth of PP Influence on planning	Falco & Kleinhans 2018a; Hasler et al. 2017; Gün et al. 2019; Czepkiewicz et al. 2018; Kahila-Tani et al. 2019; Sieber et al. 2016; Brown et al. 2014; Afzalan & Muller 2018
Representation of people and views, incl. sampling of participants	PPGIS adaptable to different sampling methods	Open sampling generates different range of citizen input than random sampling	Breadth of participation	Brown et al. 2014; Kahila-Tani et al. 2015; Brown et al. 2012; Brown et al., 2017
Anonymous participation	Anonymous participation can increase number of participants	Anonymity vs. demographic insight about participants (e.g. age, postcode); Anonymity vs. user-user collaboration	DPP Features PP design	Nelimarkka et al. 2014; Firmino 2003
Digital divide, digital literacy & data fluency	Rising digital literacy in society; Ubiquitous digital technologies & digital habits across society & built environment	Digital divides grow for disadvantaged groups; Citizens may not use digital devices for civic purposes	Breadth of PP	Falco & Kleinhans 2018a; Afzalan & Muller 2018; Crutcher & Zook 2009; Sieber et al. 2016; Kahila-Tani et al. 2019
Accessibility issues related to disability e.g. visual impairment	Technology can be customised to meet specific user needs	One size may not fit all, as different user groups may have specific requirements & abilities	Breadth & depth of PP Usability & UX	Falco & Kleinhans 2018a Gottwald et al. 2016

Table 1 - Thematic opportunities and challenges for the use of DPPs in urban planning, as based on the literature (3/4)

Factors	Opportunities	Challenges	Related themes	References
Unitisation & quantified metrics of participation (e.g. number of 'likes', comments, participants)	Unitisation & quantification of citizen input (e.g. number of comments, participants etc.) for benchmarking	Influence on decision-making is seldom monitored; Unsuccesful projects are rarely shared; Unitisations are not indicator of success; Atomisation of participation	Influence on planning DPP features	Møller & Olafsson 2018; Gün et al. 2019; Stempek & Sifry 2018 Hasler et al. 2017; Kahila-Tani et al. 2019; Sieber et al. 2016; ; Douay & Prévot 2015
Data quality of citizen-contributed data	As experts of their own living environment, citizens can contribute high quality & diverse experiential data	Significant challenges remain regarding the spatial accuracy & quality of citizen-contributed data	Influence on planning Breadth & depth of PP	Falco & Kleinhans 2018a; Sieber et al. 2016 Rzeszewski & Kotus 2019; Brown & Kyttä 2014 Kahila-Tani et al. 2019; Hasler et al. 2017
Use of citizen input in plans, projects and policy-making	Potential for collaborative evaluations of digital participatory processes themselves w/ residents	Influence on planning is indirect; Cherry-picking of citizen contributions; Participatory vs. representative democracy; Risk of tokenistic participation	Influence on planning	Stempek & Sifry 2018; Kahila-Tani et al. 2019; Haklay et al. 2018;
Feedback to the public & follow-up about use of citizen input in spatial planning	DPPs can facilitate both participation processes & follow-up to meet trust & transparency democratic requirements	Recurrent lack of follow-up on DPPs about use of citizen input	Influence on planning Transparency Workflows & processes	Marzouki et al. 2017; Gün et al. 2019; Falco & Kleinhans 2018
Trust b/w public & local government	DPPs can help build or grow trust	Trust as prerequesite for & long-term outcome of participatory processes; lack of trust can hinder participation		Gün et al. 2019; Afzalan & Muller 2018
Transparency of DPP design & participation process	DPPs can facilitate the transparency of planning processes	DPP design bears political implications;	DPP features PP design	Nelimarrka et al. 2014; Gün et al. 2019; Marzouki et al. 2017; Afzalan & Muller 2018; Cabannes & Lipietz 2017; Parra et al. 2017
Usability & User experience	Online tools are often easy to use and can support optimal inclusion; Usability can be most significant adoption factor by local government	One size may not fit all: different user groups may have specific requirements & abilities	DPP features	Haklay & Tobón 2003; Gün et al. 2019; Falco & Kleinhans 2018a; Gottwald et al. 2016; Rzeszewski & Kotus 2019; Narooie 2014; Kahila-Tani et al. 2019; Meng & Malczewski 2010; Broberg et al. 2013; Billger et al. 2016
Scalability	Customisability per geographical scale: from buildings to metropolitan scale	Aggregation & coordination between online & in-person participation methods	DPP features	Falco & Kleinhans 2018a; Møller & Olafsson 2018; Desouza & Bhagwatwar 2014; Hasler et al. 2017; Kahila-Tani et al. 2019; Pocewicz et al. 2012; Goncalves et al. 2014
Flexibility (e.g. planning stage, project duration)	Many digital planning projects applied early in planning processes; Customisabilty per planning phase & project duration	Statutory consultation may only require PP late in planning; DPPs seldom applied to full life cycle of planning projects	DPP features Workflows & processes	Falco & Kleinhans 2018a; Kahila-Tani et al. 2019; Parra et al. 2017; Babelon et al. 2016
Dependability on planning context	Customisable per context; Generalist and/or bespoke platforms	DPPs are no silver bullet to effective public participation; No evidence of "one size fits all"	DPP features Ecosystem of tools	Sieber et al. 2016; Jankowski et al. 2017; Parra et al. 2017

Table 1 - Thematic opportunities and challenges for the use of DPPs in urban planning, as based on the literature (4/4)

Factors	Opportunities	Challenges	Related themes	References
Dialogue & deliberation	DPPs can facilitate dialogue & deliberation (i.e. 2-way information flow) in various ways	Information overflow; Two-way dialogue is rare, but seems more common in DPPs enabling citizen-produced solutions; Trained staff for moderation	• DPP features • PP design • Workflows & processes	Ertio 2015; Kahila-Tani et al. 2019; Desouza & Bhagwatwar 2014; Hasler at al. 2017; Falco & Kleinhans 2018b; Afzalan et al. 2017
Participatory functionalities inspired from social media (e.g. likes, quick commenting)	Simplified participation can increase volumes of participation and facilitate monitoring and quantification	Increased volumes of contributions vs. depth of participation; Positive framing of participation can preempt conflict	DPP features Usability & UX Influence on planning	Sieber et al. 2016; Douay & Prévot 2015
Data protection, security, privacy	Security & privacy can be important components of trust in technology & local government;	Security requires robust technology	DPP Features PP design	Gün et al. 2019; Nelimarrka at al. 2014 Narooie 2014; Kahila-Tani et al. 2019; Viitanen & Kingston 2014
Growth in DPP adoption and DPP market	Growth in number of DPPs for wide range of purposes, incl. co-production; Growing international experience & best practice	Informing & consultation still seems more prevalent than co-production; DPPs risk being an end in themselves	DPP adoption Breadth & depth of participation Workflows & processes	cf. Falco & Kleinhans 2018a; Gün et al. 2019; Sandoval-Almazan et al. 2011; Fung 2015; Ertiö 2015; Ertiö & Bhagwatwar 2017; Griffin & Jiao 2019; Hasler et al. 2017; Nelimarkka et al. 2014
Data ownership	Public, transparent digital participation makes input data accessible to all	Interoperability of data & urban governance issues may obscure data ownership	DPP Features PP design	Falco & Kleinhans 2018a
Licensing & development mode	Open Source software more aligned participatory democracy ethos; Proprietary innovations pooled among clients	Local government may lack resources to utilise Open Source software, Unattractive to develop in-house platform	DPP features DPP adoption	Nelimarrka et al. 2015 Falco & Kleinhans 2018a
Pace of technological innovation vs. institutional adaptation/innovation	Concurrent changes in technology and institutional innovation reshape planning practices	Technological innovation outpaces institutional innovation & research;	DPP features DPP adoption Workflows & processes	Hasler et al. 2017; Afzalan & Muller 2018 Anttiroiko 2012b; Falco & Kleinhans 2018a
Interoperability of data, software & hardware	Participatory ICTs can support smart city governance & data-informed planning	Risk of favouring data-driven rather than participatory approach to urban governance	DPP features PP design Workflows & processes	Castelnovo et al. 2016; Meijer et al. 2016; Afzalan et al. 2017; Hasler et al. 2017
Complementarity of in-person methods & online participatory tools	Different demographic groups tend to participate in in-person & online methods	More knowledge required for synergies b/w in-person methods and DPPs	Ecosystem of tools	Møller & Olafsson 2019; Gün et al. 2019 Afzalan & Muller 2018; Seltzer & Mahmoudi 2013; Brown et al. 2014; Pocewicz et al. 2012 Stern et al. 2009
Complementarity of sensor/ reporting apps & online participatory tools	Citizen-sourced data from sensor & reporting apps can inform discussion on online participatory tools	Citizen-sourced data from sensor & reporting apps as relatively passive form of participation	Ecosystem of tools	Afzalan & Muller 2017; Ertiö 2015; Desouza & Bhagwatwar 2014

Upon that basis, Figure 15 provides an overview of some of the key socio-technical factors that affect the use of digital participatory platforms as articulated in terms of opportunities and challenges. Figure 16 displays categorisations of socio-technical factors in terms of user-centred issues and Planning 2.0.

Figure 15 - Opportunities and challenges for the use of DPPs

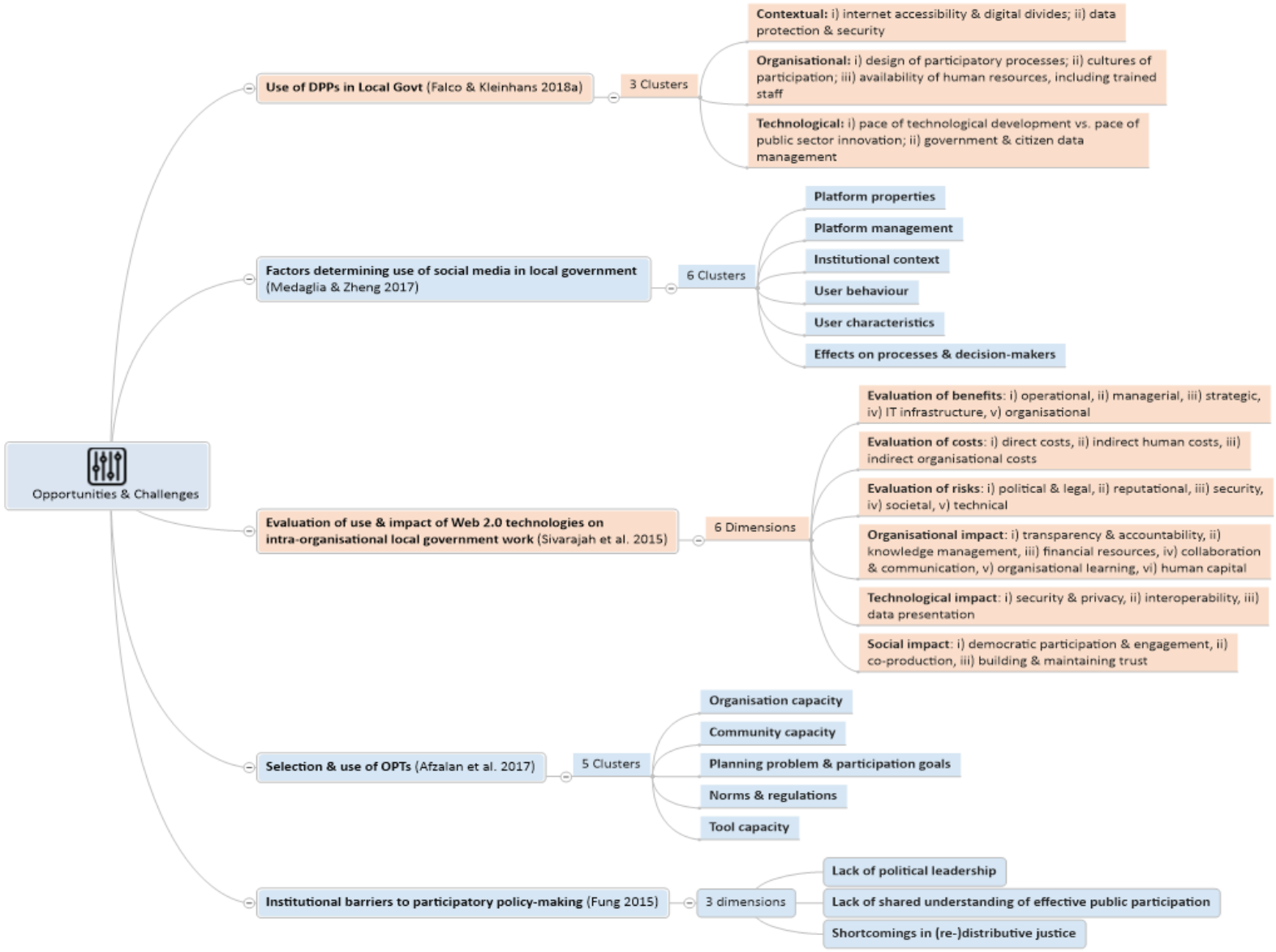
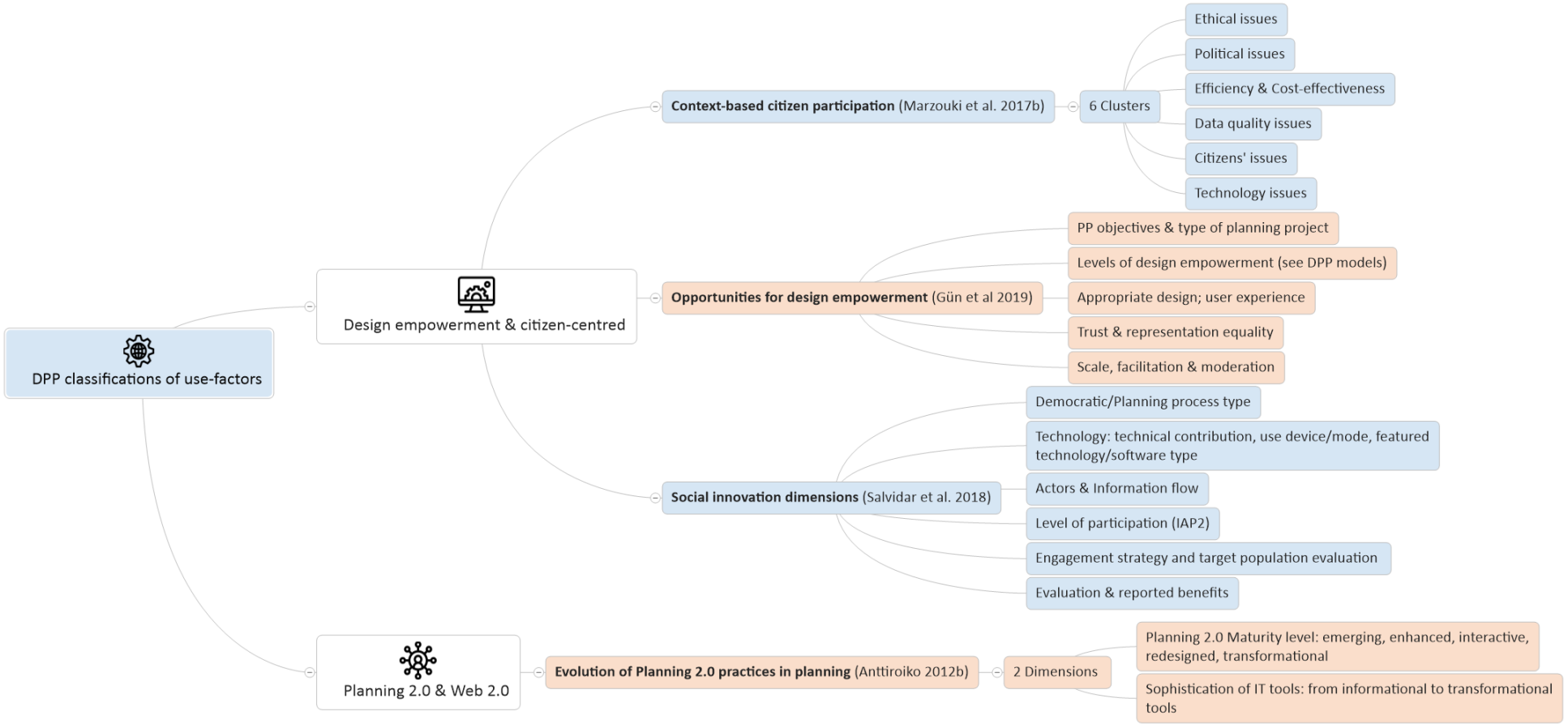
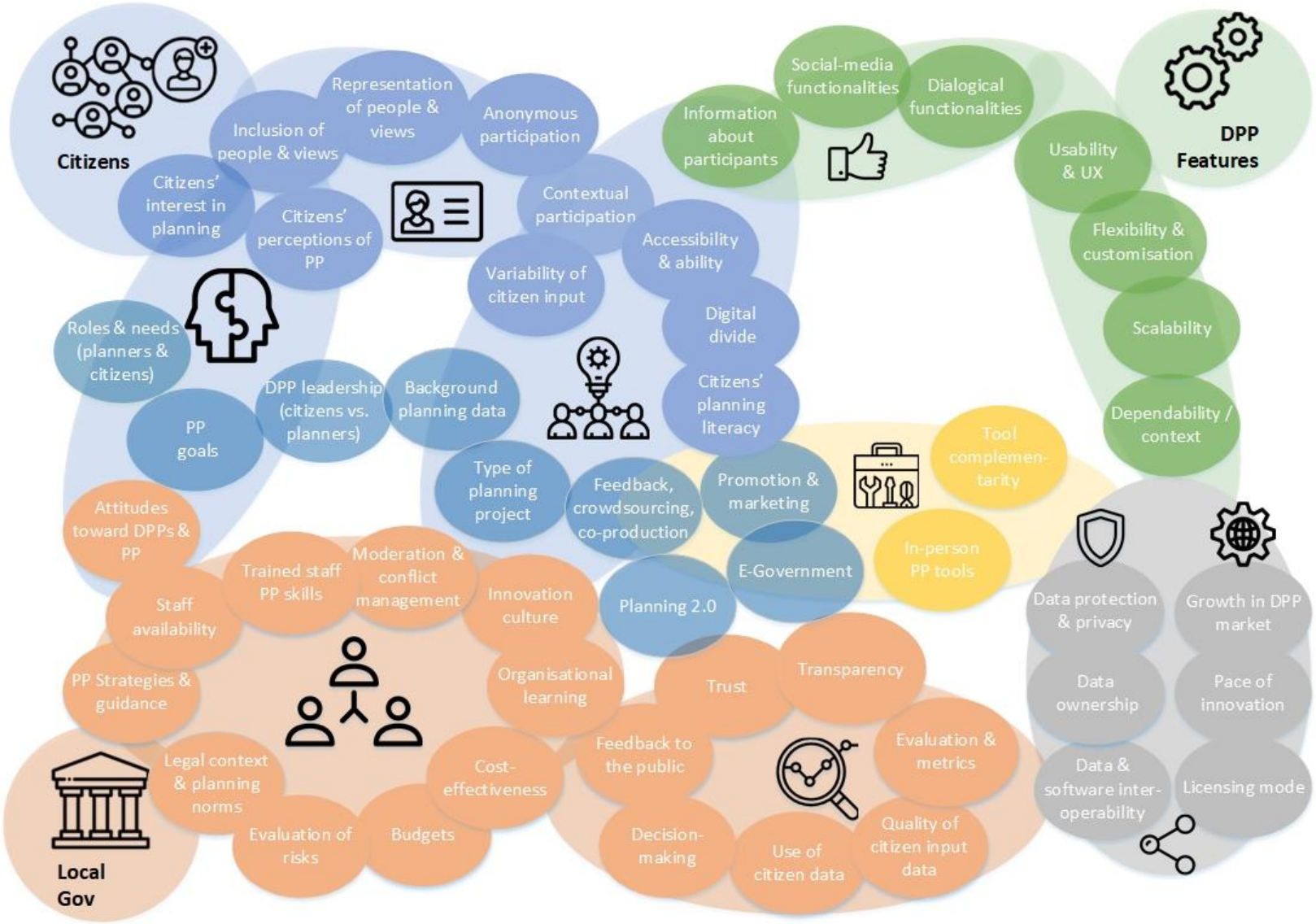


Figure 16 - Categorisations of socio-technical issues in terms of citizen centred issues and Planning 2.0



Finally, based on Figures 15 and 16, Figure 17 provides a fuzzy diagrammatic overview of all the interrelated clusters of factors presented above in text, tabular, and mind-map form. Taken altogether, this web of socio-technical factors seems to characterise the use of DPPs in urban planning. All the figures in this section emphasise the complex socio-technical nature of public participation processes, and the interdependence between the various factors, which pave the way for a reconceptualization of the hybridity of the use of DPP in urban planning.

Figure 17 - Fuzzy diagram exploring the landscape of interrelated factors that affect the use of DPPs in urban planning



3.10 Chapter summary

Building on 'digital first' (a.k.a. 'digital by default') approaches to public service delivery in local government, the emergence and penetration of Web 2.0 technologies in the public sector enable to leverage innovative participatory planning practices, coined Planning 2.0 by analysts. Enduring barriers to digital participation in local government include digital divides in the form of constrained access to and limited civic appropriation of digital technologies by citizens. As a result, already hard-to-reach groups risk further marginalisation from (a lack of) interaction with local government, including participatory planning. Notwithstanding the growing adoption of a wide range of digital participatory technologies in urban planning, obstacles to their further adoption and use appear institutional and organisational rather than technological. The literature also highlights multiple, complementary rationales for greater consideration of citizen views and knowledge in participatory urban planning in the form of crowdsourcing, co-production, a recognition of citizens' multiple overlapping roles in society, and social learning. Importantly, citizen participation is performative, contextual and reflects a diversity of publics and plentiful opportunities for conflict.

The literature on innovation in the public sector identifies key conditions to and drivers of transformative processes of innovation, in particular: institutional environments that foster innovation and participation, intra-organisational capacity, intra-organisational openness to innovation and learning, sufficient human and material resources, the capacity to take stock of and appropriate best practice guidance, and political support and leadership. Innovation may also be technologically-driven and/or collaborative and embody complex governance arrangements that compete with or complete each other. The literature on local democratic innovation also highlights the need to investigate community engagement practitioners' perspective directly. Factors such as practitioners' engagement and mediation skills, material and financial resources, public trust in public organisations, professional and political cultures of evidence-based planning and the presence of clear and supportive institutional environments bear important implications for the day-to-day practice of public participation. In all, the chapter reveals the numerous organisational and institutional interdependencies that determine innovation processes that underpin the use of digital participatory technologies and practices.

4 Methodology

4.1 Introduction

The methodology chapter builds on the State-of-the-Art to articulate the research design for the thesis. The chapter begins with a problem statement that highlights the knowledge gaps identified in the State-of-the-Art about the use of DPPs in urban planning. The scope of the thesis is then presented which provides 6 research questions that match the identified gaps in knowledge. The research questions directly frame the content of the concurrent interview and online survey data collection methods. The scoping section also delimits the range of technologies, use-cases and research participants for the thesis.

4.2 Problem statement, scope & research questions

The problem statement reiterates the knowledge gaps identified in the State-of-the-Art, particularly as regards empirical insight about the use of different DPPs across a range of planning contexts. Indeed, only few studies and reviews consider the broad landscape of DPPs (Afzalan, 2015; Falco & Kleinhans, 2018b; Gün et al., 2019, p. 3). A much larger number of studies review individual technologies (Brown & Kyttä, 2014; Ertiö, 2015; Kahila-Tani et al., 2019; Saldivar et al., 2018; Touchton et al., 2019). Equally, many studies focus on small samples of use-cases for individual technologies (e.g. Griffin & Jiao, 2019; Hjerpe et al., 2018; Meng & Malczewski, 2010; Jiří Pánek, 2019; Parra et al., 2017; Sieber et al., 2016; H. Wu et al., 2010). Furthermore, more empirical studies are needed that explicitly investigate the multiple socio-technical dimensions of DPPs, including their influence on planning processes (Babelon et al., 2016; Falco & Kleinhans, 2018a; Sieber, 2006; Sivarajah et al., 2015).

Empirical academic knowledge about the use of digital participatory platforms in urban planning seems to lag behind recent technological and participatory planning innovations in practice (Afzalan & Muller, 2018; Babelon et al., 2016; Hasler et al., 2017). This dearth of empirical data is compounded by the fact that empirical studies seem rare (e.g. Afzalan, 2015; Berner et al., 2011; Slotterback, 2011). The main research gaps in the State-of-the-Art concern a shortage of empirical insight about the use of DPPs in urban planning, including:

I. The objectives for public participation mobilised in practice
II. Evaluation of DPPs real influence on planning decisions
III. The range of DPP functionalities which are perceived as most useful by practitioners
IV. The manner in which DPPs complement other tools for public participation
V. The main organisational and institutional factors that determine the adoption and use of DPPs

Objectives. Objectives for public participation remain somewhat indeterminate. This indeterminacy is arguably associated with a dearth of empirical investigations about stated objectives. It also seems related to the diversity of technological, organisational and institutional factors that guide the adoption and use of DPPs in urban planning. The literature articulates a range of advantages, shortcomings, opportunities and challenge for the choice and use of DPPs, and the corresponding need for clear engagement strategies and transparent participatory processes. However, few studies seem to collect empirical survey or interview attitudinal data from planning and community engagement practitioners. A cave-at concerns e-Participatory Budgeting as it seems to generate comparatively more empirical studies due to its recognised potential to leverage transformative local democratic practices (e.g. Bartocci, Grossi, & Mauro, 2019; Parra et al., 2017; Touchton et al., 2019). Models for public participation and digital participation abound at the same time as there is a contrasting dearth of empirical studies to substantiate these models and apply them to the fast-evolving field of digital participation in local government.

Influence. Assessing the real influence of DPPs on planning decisions is difficult. In this realm, too, reigns significant indeterminacy. Based on their critical analysis of about 200 *Maptionnaire* geoparticipation surveys conducted across the globe, Kahila-Tani et al. (2019, p. 54) indicate that while PPGIS can help broaden public participation and help include citizen views in planning, "there is no guarantee that PPGIS data would be more influential than knowledge produced in more traditional public participation processes." This indeterminacy may be exacerbated if the citizen input is insufficiently reliable and valid, for example in the context of complex planning projects. Projects such as participatory budgeting portals may have a more explicit potential for collaboration and empowerment than other DPPs. However, influence remains difficult to evaluate fully due to context-dependability, including levels of transparency, breadth and representativeness of participation, allocated budgets per inhabitant, and the distribution of budgets per district, including aspects of redistributive justice and equity (Baiocchi & Ganuza, 2014; Parra et al., 2017; Shybalkina & Bifulco, 2019; Wilkinson, Briggs, Salt, Vines, & Flynn, 2019). In all, more empirical evidence is required to assess the influence of DPPs on planning decisions in a variety of planning contexts.

DPP features. The literature lists typical ranges of technological features found on DPPs (Afzalan & Muller, 2018; Falco & Kleinhans, 2018b; Gün et al., 2019). Usability studies have generated insight about specific and general interaction difficulties encountered by participants on DPPs, especially for geoparticipation (Gottwald et al., 2016; Meng & Malczewski, 2010; Rzeszewski & Kotus, 2019; H. Wu et al., 2010). Other studies consist of observation-based reporting and analysis of DPPs by the authors themselves (Afzalan & Muller, 2018; Falco & Kleinhans, 2018b; Gün et al., 2019). Only a small minority of studies investigate the perceived usefulness of DPP technological features from the perspective of city staff (e.g. Afzalan, 2015). Therefore, more empirical evidence is required to assess

the perceived usefulness of DPP features from the perspective of urban planners and community engagement officers for a wide range of platforms and use-cases.

Tools for public participation. Studies customarily recognise the need to combine DPPs with other tools for public participation. A key rationale concerns enduring marginalising effects associated with digital divides and civic deficits in society. Furthermore, different methods for public participation attract different people and therefore enable to collect different views from those gathered on DPPs (Alverti et al., 2016; Brown et al., 2014; Czepkiewicz et al., 2018; Pocewicz, Nielsen‐Pincus, Brown, & Schnitzer, 2012; Stern et al., 2009). Case-studies usually illustrate how different participatory technologies are combined in specific locales (e.g. Nummi, 2018; Jiří Pánek, 2019; Parra et al., 2017). However, few if any studies explicitly investigate the complementarity between DPPs and other tools for public participation across a wide range of planning contexts and participatory technologies. More empirical evidence is therefore needed about the manner in which DPPs are deployed alongside other tools for public participation in a variety of use-contexts.

Organisational and institutional factors. Analysts have identified and provided different analytical classifications of the wide range of technical, organisational and institutional factors that affect the use of DPPs in urban planning. While immensely useful, only a small minority are based on empirical data from a range of DPPs and use-contexts, and these typically concern a specific sub-field, such as geoparticipation (e.g. Brown & Kyttä, 2014; Sieber et al., 2016). Consequently, there is a need for empirical evidence about the range of socio-technical factors that affect the use of different types of DPPs across a wide range of use-contexts.

Common knowledge gaps across all five areas of interest concern the perspectives of planning professionals and software providers. Additionally, investigations of broader samples of DPP types and use-cases are required for different planning contexts. Underpinning all identified knowledge gaps is the under-theorisation of the inherent hybridity of DPP use in urban planning.

Planning professionals. The perspectives of planning professionals responsible for the management of DPPs seem understudied (Afzalan, 2015; Slotterback, 2011), as is the case more generally for community engagement officers (Escobar, 2014; Escobar et al., 2018). Depending on context and job responsibilities, these professionals can include urban planners, community engagement and communications officers, and elected officials. Their views need to be more systematically considered in the academic literature.

Software providers. The perspectives of software providers seem largely absent from the academic literature. At the same time, software providers are vocal and active in a wide range of professional networks, online blogs, conferences, workshops and various forms of client support. Interestingly, DPP software providers can also work as academic researchers and publish research outputs based on

consultancy projects (e.g. Kahila-Tani et al., 2019). It is also hypothesised that knowledgeable staff at DPP start-ups accumulate substantial experience and insight about the manner in which their software is used across a wide range of use-cases. Therefore, there is a greater need to consider the perspectives of software providers explicitly.

Range of DPPs and use-cases. The range of DPPs and use-contexts considered in the literature concerns either: i) a small number of empirical use-cases; ii) a range of use-cases for a specific type of DPP, or iii) a wide range of use-cases investigated through desktop research rather than based on empirical evidence. Finally, few if any studies seem to to consider both the perspectives of planning professionals and software providers for a wide range of DPPs and use-contexts. Exceptionally few studies collect *empirical data* that consider both perspectives above for a wide range of DPPs and use-contexts. There is therefore a greater need to collect the views of the main actors of DPP innovation for a diversity of digital technologies and use-cases.

Theory of DPP hybridity. In addition to the above, the field of digital participation seems under-theorised. The majority of digital participation studies embrace a range of approaches to participatory planning, such as communicative planning-inspired approaches, to develop models of digital participation that consider governance, data, and/or citizen-government relations in different ways. Despite a widespread recognition of interdependencies between the various socio-technical components of digital participation, the abundance and diversity of existing models and typologies hinder syntheses in the field. To help remedy this situation, there is a need for an overarching theorisation that fully takes stock of the hybridity and interdependencies between the main sets of socio-technical issues that determine the use of DPPs in urban planning.

To attend to the identified gaps in empirical knowledge about the use of DPPs in urban planning, the aim of the research is to investigate the use of digital participatory platforms (DPPs) in urban planning. In particular, the aim to investigate and interlink the key identified socio-technical dimensions that seem to affect the use of DPPs. Six research questions guide the data collection:

RQ1. Which objectives for public participation do DPPs enable?

RQ2. Which levels of influence on urban planning decisions do DPPs enable?

RQ3. Which technological features on DPPs are perceived as most useful?

RQ4. How do DPPs complement other tools for public participation?

RQ5. Which main organisational and institutional factors affect the adoption and use of DPPs in urban planning?

RQ6. How can the use of DPPs be theorised to better reflect their hybrid use in urban planning?

By augmenting empirical evidence about the respective socio-technical factors, RQs 1 to 5 each provide important contributions to knowledge. The aim of RQ6 is to weave all five strands of empirical enquiry into a theoretical contribution to knowledge. Additionally, the research questions enable to leverage some evidence-based recommendations and insightful observations about the use of DPPs in urban planning. These recommendations and insights help to synthesise the discussion of the empirical data and provide avenues for further research and innovation in the field of digital participation.

Given the wide range of ontologies of digital participatory tools in the literature, this thesis settles for the use of the term *digital participatory platforms* (DPPs) provided by Falco and Kleinhans (2018b):

> A specific type of civic technology explicitly built for participatory, engagement and collaboration purposes that allow for user generated content and include a range of functionalities (e.g. analytics, map-based and geo-located input, importing and exporting of data, ranking of ideas) which transcend and considerably differ from social media.

This choice is guided by an effort toward simplification. The aim was pragmatic rather than to favour any particular term, given the conspicuous absence of any authoritative terminology in the fast-evolving landscape of digital participation. As discussed in the literature review, this predicament of terminological diversity also characterises the field of public participation at large, despite repeated calls for unifying terminologies and greater clarity about what citizen participation really is (Arnstein, 1969; Connor, 1988; Rosener, 1978; Rowe & Frewer, 2005). Rather than seeking to add to terminological diversity, the thesis focuses instead on providing additional empirical evidence to help re-theorise the hybrid use of digital participatory platforms in urban planning.

The thesis focuses on local government-initiated digital public participation projects. Therefore, the research mostly excludes citizen-initiated projects in the form of Participatory GIS (PGIS), community planning, community GIS or 'counter-mapping'. Such citizen-driven forms of participation are not directly tied to formal urban planning process initiated or overseen by local government or urban planning consultancies (Aggett & McColl, 2006; Elwood, 2006; Elwood & Mitchell, 2013; Ghose, 2003; Radil & Anderson, 2018; Verplanke et al., 2016).

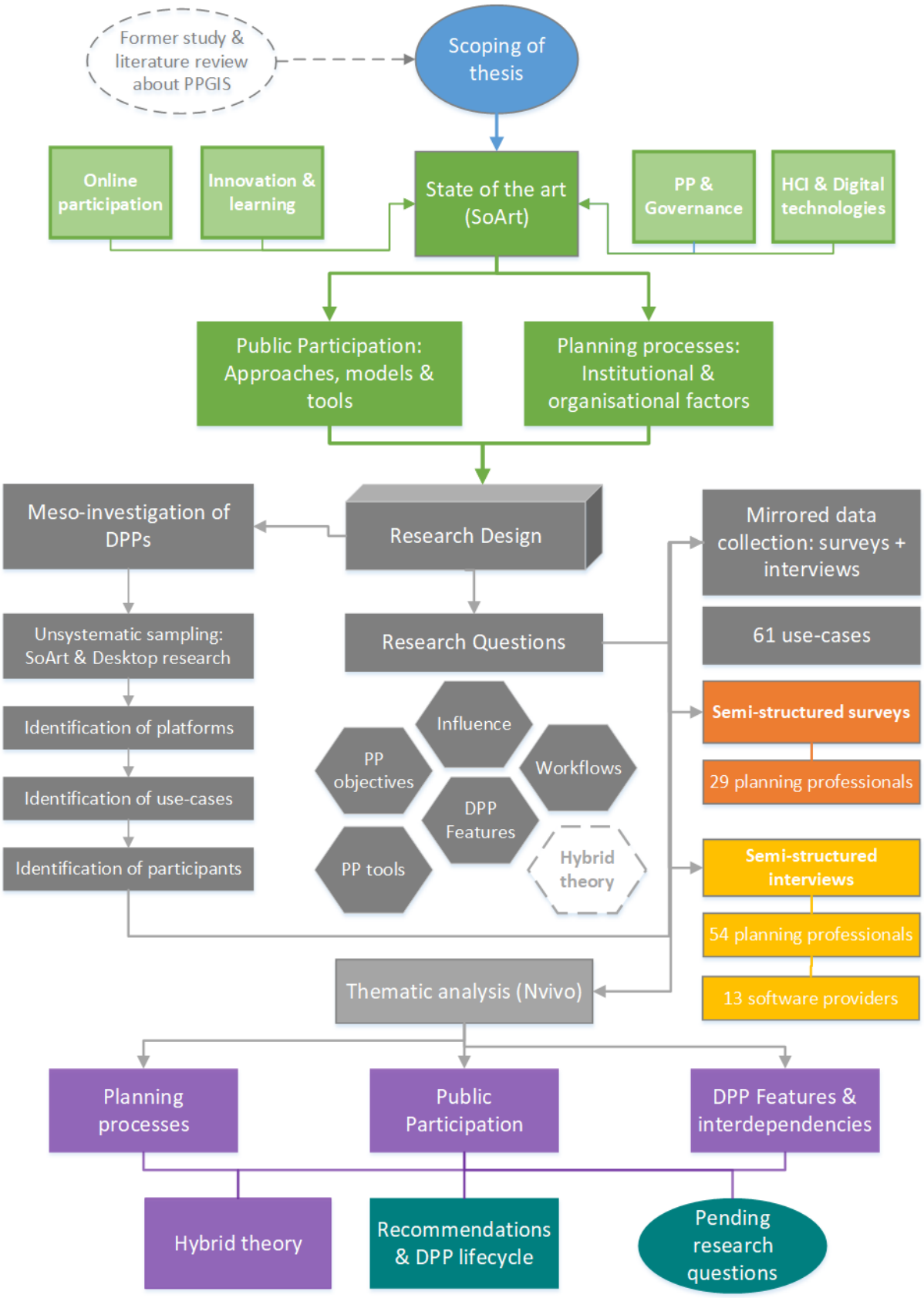
The following technologies are not investigated in the thesis because they do not strictly qualify as DPPs. In terms of geoparticipation, small-group Geoweb collaboration, citizen science platforms, Volunteered Geographic Information (VGI) and 3D landscape visualization technologies are mostly beyond the scope of the thesis (cf. Al-Kodmany, 1999; Filip Biljecki, Jantien Stoter, Hugo Ledoux, Sisi Zlatanova, & Arzu Çöltekin, 2015; Brown & Kyttä, 2018; Elwood, Goodchild, & Sui, 2012; Güiza & Stuart, 2017; Verplanke et al., 2016; Werts, Mikhailova, Post, & Sharp, 2012). Platforms that focus solely on reporting faults and failure in public space and public infrastructure (e.g. 311 services) are excluded, as are bespoke applications that nudge/encourage urban residents to adopt more a

sustainable lifestyle and mobility behaviour (see Ertiö, 2015). The thesis also does not investigate gamification, or "serious games", in the form of pervasive games or online games of use in urban planning (e.g. Minecraft) nor does it investigate the related use of participatory playful digital media (I. D. Bishop, 2011; Leorke, 2019; Poplin, 2014; Reinart & Poplin, 2014; Torner et al., 2012; Tulloch, 2008). Virtual Reality (VR) platforms such as Second Life and Augmented Reality (AR) applications constitute separate fields of enquiry (Cirulis & Brigmanis, 2013; Hanzl, 2007; Lange, 2011; Portalés, Lerma, & Navarro, 2010; Portman et al., 2015). Also excluded are ICT-augmented tools that merge any combinations thereof, such as exploratory tools that combine urban design and citizen science (e.g. Mueller et al., 2018). Civic hackathons and app development contests do not qualify as DPPs within this thesis (see Johnson & Robinson, 2014; Zapico, 2014). Social media are also excluded from the main focus of the thesis. DPPs can be portrayed as a type of social media, and similar constraints may apply in terms of organisational and institutional factors. However, they also display fundamental differences in terms of technological features such as interactive capacities (Falco & Kleinhans, 2018a, 2018c).

4.3 Research Design

The research design for the thesis is synthesised in Figure 18. A cross-thematic literature review informs the State of the Art which helped to select and shape the appropriate research design. The research design is presented first in terms of a social constructionist epistemological stance. It then presents how a social constructionist worldview is best operationalised through a socio-technical approach to investigate the use of DPPs in urban planning.

Figure 18 - Flowchart for the PhD research as a whole



Social constructionism provides the epistemological foundation for the thesis. At its core, social constructionism investigates the social processes by which knowledge and reality are constructed *and* construed by individuals and groups in society. Lynch (2016) indicates that multiple strands and terminologies of social constructionism have flourished since its first inception in the social sciences, which require some explanation here. The landmark publication *The Social Construction of Reality* by Berger and Luckmann (1967) established the conception that social processes underpin the production of all institutional forms of knowledge, in ways that are typically unbeknownst to most members of a society. Berger and Luckmann (1967)'s theory draws on the work of prominent sociologists and philosophers such as Emile Durkheim, Karl Mannheim, Max Weber and Max Scheler, including a strong historicist tradition within German sociology which explained societies in terms of specific socio-cultural historical contexts, as opposed to universal laws of social structure. The original notion of social construction lacks the latterly added '-ism', and the risk of dogmatic advocacy which 'isms' entail (Lynch, 2016). Social constructionism should also be disambiguated from the social constructivist approach to education found in the work of Jean Piaget and others (Kalina & Powell, 2009), although the terms are sometimes used interchangeably (Lynch, 2016).

Berger and Luckmann (1967) postulate that knowledge is externalised as independently real and institutionalised through objectivation as formal social institutions. Knowledge becomes legitimate and authoritative through widespread socialisation and internalisation by members of society. Toward this end, institutions typically create moral and legal codes, compliance norms, and other measures of social control to support the legitimation, dissemination and reproduction of desired forms knowledge and conduct. Once knowledge and conduct become crystallised in the form of formal institutions and organisations and are internalised within people through habituation, the actual social origins of both knowledge and institutions become opaque. Knowledge becomes reified when people take knowledge for granted as objectively true and internalise it as such. Critically, Berger and Luckmann (1967) view that elites can largely benefit from having 'the masses' blindly follow institutional orders, which view echoes with a Marxist legacy in the social sciences. The more social institutions are taken for granted, the greater their stability.

Berger and Luckmann's text was instrumental in harbouring post-positivist, post-structuralist and interpretivist approaches to the study of social phenomena, contributing to a strong cultural turn within the social sciences at large by challenging determinist approaches inspired from the natural sciences (Bonnell, Hunt, & Biernacki, 1999). Social constructionist approaches can be found in the work of Michel Foucault, Roland Barthes, Pierre Bourdieu, and others. The social production and reproduction of knowledge and institutions has been compellingly conveyed in notions such as the habitus, cultural distinction and cultural capital (Bourdieu, 1977, 1979) as well as structuration

(Giddens, 1984), which interlink individual and collective processes of socio-cultural identity formation and transformation over time. Social constructionism has also influenced Science and Technology Studies (STS) in various ways (Lynch, 2016), including scholars such as Bruno Latour, John Law, and Tim Ingold, among others (Callon, Rip, & Law, 1986; Ingold, 2013; Latour, 2005; Law, 2004). Subsequently, a social constructionist understanding of knowledge production has pervaded investigations of social learning in spatial planning, including policy evaluation, communities of practice, organisational innovation and institutional capacity (Escobar, 2014; Innes & Booher, 2010; von Schönfeld, Tan, Wiekens, Salet, & Janssen-Jansen, 2019; Wenger, 1999; Wildavsky, 2007 [1979]). Furthermore, critical realist approaches to urban planning explicitly address the underlying socio-political and cultural foundation and dynamics of dominant forms of knowledge and practices, and how these pre-empt or sideline alternative knowledge claims and practices (Flyvbjerg, 2002; Rosol, 2015; Swyngedouw, 2010).

Two main critiques have been levelled at some social constructionist approaches, however. The first critique concerns what realists perceive as a disregard for scientific claims in such varied contexts as environmental change or public health. A second related critique is the perception that social constructionists disengage politically and morally from the objects of their study, implying that moral and political investment is ethically required on the part of researchers. Such critiques are partly misled as social constructionist approaches do not challenge scientific claims per se, but instead lay bare the social dynamics that underpin their production. Furthermore, a dispassionate engagement with objects of study not only enables more objective investigations, it also illustrates that the choice of particular epistemology does not come with any *a priori* political and moral assumptions. Ironically, social constructionist studies often do, in effect, support the 'underdog' and their foreclosed knowledge claims, if only implicitly (Burningham & Cooper, 1999). Advocacy forms of STS remain more common than earlier, dispassionate studies that adopted Actor Network Theory. The latter have waned over time, presumably because they do not politicise the production of scientific, expert knowledge sufficiently (Lynch, 2016).

This thesis primarily adopts a critical realist variant of social constructionism as an epistemological stance (Davis & Andrew, 2018; Forester, 2013) (see Section 2.2.4). The latter is grounded in a socio-technical approach to the investigation of DPPs. A socio-technical approach enables to combine the various technological, organisational and institutional factors that determine the use of DPPs in urban planning. Borrás and Edler (2014, p. 1) introduce socio-technical systems in the following manner:

> The notions 'socio-technical system' and 'innovation system' refer to the fact that individual technical artefacts or innovations are not operating in isolation. On the contrary, the functioning of technical artefacts and innovations is highly dependent on specific and complex ensembles of elements in which they are embedded. It is not the individual artefact or innovation as such that

> has an effect, but its interplay with and embedding in other technical and non-technical elements in society and the economy.

This approach to the study of technology particularly befits the varied literature on DPPs. It grounds the investigation of technical and technological elements in their organisational and institutional setting. On this basis, Borrás and Edler (2014, p. 11) define socio-technical systems as:

> Articulated ensembles of social and technical elements which interact with each other in distinct ways, are distinguishable from their environment, have developed specific forms of collective knowledge production, knowledge utilization and innovation, and which are oriented towards specific purposes in society and economy.

Similarly, the different models of digital participation and ontologies of DPPs reviewed in the State-of-the-Art highlight that the use of DPPs is inseparable though 'distinguishable' from their wider use-context, including the purpose of their use. The State-of-the-Art reviews some of the most noteworthy models for digital participation. Arguably one of the most complete models that predates the majority of models reviewed in the State-of-the-Art is the analytical framework advanced by Renée Sieber (2006). Writing specifically about PPGIS, Sieber (2006) proposes the following framework: i) place and people; ii) technology and data; iii) process; and iv) outcomes and evaluation.

Furthermore, the deployment of DPPs in urban planning constitutes the point of interaction between two different organisational purposes and logics: a *managerial* logic of improving the effectiveness and efficiency of planning processes on the one hand (i.e. the perspective of planning agencies), and the *entrepreneurial* perspective of software development and distribution (i.e. the perspective of software providers). In attempting to map the governance of change in socio-technical systems, Borrás and Edler (2014, p. 8) classify the focus of the literature on socio-technical systems based on four main complementary foci, as show in Table 2.

Table 2 - The governance of change of socio-technical and innovation systems: implicit approaches in the literature, adapted from Borrás and Edler (2014, p. 8)

	Economy and market context	Socio-cultural context
Agency centred	Entrepreneurialism	Bricolage
Institution centred	Meta-coordination	Institutional coupling

They further define agency and institutions as follows (2014, p. 7):

> Agency refers here to the organizations and individuals that are agents of action in socio-technical and innovation processes. Institutions, for their part, are the formal or informal rules of the game constraining and enabling agents of sociotechnical and innovation processes

The different dimensions in Table 2 map out the landscape for socio-technical change. It juxtaposes individual-centred dynamics of change in the market (i.e. entrepreneurialism) with corresponding dynamics in socio-cultural contexts (i.e. bricolage). While entrepreneurialism can be associated with leveraging change on the market, bricolage entails learning how to adapt and apply rules and processes within organisational and other contexts. This conceptualisation of learning can be approached from the overlapping lenses of change and innovation. Fuglsang (2010, p. 82) outlines three main approaches to innovation in the public sector:

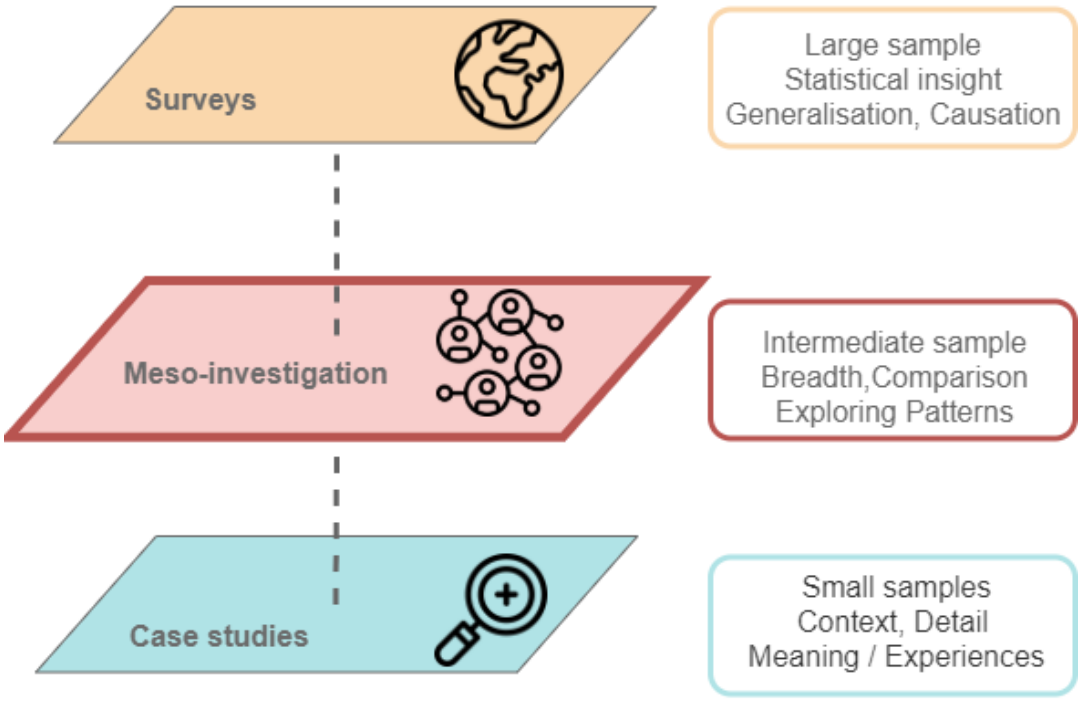
> 1) Innovation as an intentional activity, 2) innovation as a semi-intentional activity, and 3) innovation as bricolage. For management, innovation is intentional and imposed. For employees it is bricolage and intrinsically motivated.

Rather than focusing exclusively on socio-technical innovation, the research design incorporates the underpinning approach to technology as embedded in use-environments. The research design for the thesis also adopts a theory of DPP hybridity that addresses ontological and epistemological dimensions of DPPs, as elaborated in the Discussion chapter.

4.3.1 Qualitative meso-investigation

In regards to the research design for the thesis, a meso-level qualitative approach was most appropriate to help fill the identified knowledge gaps. The 'meso' dimension specifically denotes a middle range of cases that lies between a handful of case-studies and a large-scale survey. The approach provides multiple benefits. The intermediate sampling approach enables to find a balance between highly granular, in-depth knowledge about a small number of case studies on the one hand (Gerring, 2004; Yin, 2003) and the more general, de-contextualised insight gathered through aggregate survey data about a very large number of cases (Bryman, 2003). Figure 19 illustrates diagrammatically how a qualitative meso-investigation relates to survey and case-study approaches.

Figure 19 - Illustration of the level of a qualitative meso-investigation (in the middle), relative to case-studies and quantitative surveys



Each approach can lead to different types of theories. Citing Neuman (2009), Creswell and Creswell (2018) mention three different levels of theory: those occurring at the *micro-level* (limited in time, space and the number of people, for example focusing on individuals), those occurring at the *macro-level* (e.g. addressing cultural systems and whole societies), and those at the *meso-level*. The latter aims to link micro and macro levels, for example through theories that deal with organisations and movements. The unit of observation for this thesis focuses on the individual level, at meso-level analysis within two types of organisations, namely: planning organisations and DPP software companies. A consistent meso-level investigation in terms of both unit of observation and level of analysis would investigate group dynamics within organisations, which is also a missing link in organisational studies (Fine & Hallett, 2014). The study of groups within organisations was ruled out for two main reasons. The most important one is that planning professionals who manage engagement projects often seem to be the sole member of staff within their department or organisation who have the full knowledge and direct experience of managing or overseeing the DPP. When these planning professionals work in teams, the teams are often small, and several members may not be able to free themselves up to participate in research. Related to the small number of suitable participants, there are practical difficulties in reaching potential research participants. Planning professionals have to juggle busy workloads, as demonstrated in the findings. Most importantly, perhaps, insight about group dynamics and organisational workflows could be obtained from the individual planning professionals

who participated in the research. The five thematic areas of enquiry were broad and targeted enough to gather insight about both personal and group experiences of DPP use in urban planning.

A meso-investigation can generate sufficient insight about the range of the main socio-technical factors that shape the use of DPPs in urban planning across a range of technologies and urban planning contexts in different countries. The collected data is also granular enough to help identify interdependencies between sets of socio-technical factors. Although the number of cases reviewed here enables to produce some basic descriptive statistics, their diversity and uneven geographical spread lends itself more to a qualitative comparison of planning contexts and platform types.

A qualitative approach was seen as most suitable for the meso-investigation. The main reason is that the study of complex social systems does not lend itself to large-scale statistical enquiry without missing important context-based meanings and experiential knowledge (Flick, 2018; Yin, 2003). In the words of van Mannen (1977), cited in Miles and Huberman (1994, p. 10):

> Qualitative data, with their emphasis on people's 'lived experience', are fundamentally well suited for locating the meanings people place on the events, processes and structures of their lives: their perceptions, assumptions, prejudgements, presuppositions, and for connecting these meanings to the social world around them.

In terms of generalisibility, the absence of any absolute population of DPP use-cases and digital engagement officers renders the task of establishing statistical significance next to impossible. Based on available survey data, other authors have provided compelling evidence in predicting adoption factors for specific sub-sets of DPPs, such as participatory budgeting portals (Touchton et al., 2019). Even in the latter case, statistical insight remains provisional. Absolute populations for other types of participatory technologies, such as geoparticipation or one-off applications, seem more difficult to obtain. This is in part due to the dearth of available survey data. There are noteworthy exceptions, however. A national survey commissioned by the French Territorial Bank (*Groupe Caisse des Dépôts*) in March 2018 reveals that 157 local authorities were using some form of digital technology for citizen participation (i.e. including reporting applications, but excluding open data portals) (Banque des Territoires, 2018). To the best of my knowledge, this type of survey is exceptional. National agencies such as chartered professional networks and government agencies are most likely to collect such comprehensive data. As the field of digital participation in the public sector is evolving continuously, it may also be difficult to keep track of these evolutions accurately. In all, given the international and broad technological scope of the PhD, it was not deemed feasible to determine an absolute population of DPP use-cases. The meso-level approach therefore appeared most pragmatic. It also enables to collect data about a range of DPP technologies used in urban planning in different planning contexts.

Quantitative theory was also ruled out because of the difficulty of obtaining quantified orders of magnitude, causation and relationship between sets of variables (see Creswell & Creswell, 2018). Related to the latter, it was deemed inappropriate to conduct mixed methods research, whether concurrent or sequential (Creswell & Creswell, 2018; Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007). Online surveys and interviews were used in a pragmatic way to optimise and maximise data collection, as presented below in the description of the survey and interview data collection methods. The chosen data collection methods do not therefore adopt the pragmatic mixed modes detailed by Onwuegbuzie and Leech (2005).

Lastly, the meso-level investigation complements existing studies that investigate a wider range of platforms and use-cases, but lack empirical data obtained from planning professionals or software providers (e.g. Falco & Kleinhans, 2018b; Gün et al., 2019; Hasler et al., 2017). However, only few studies have been identified that base their analysis on interview or survey data collected from planning professionals (e.g. Afzalan, 2015; Slotterback, 2011). As the latter studies focus on the use of DPPs in US cities, the international focus of the research in the thesis provides a valuable empirical complement. Additionally, no studies have been identified that explicitly consider the views of software providers. Table 3 gives an indication of the number of use-cases and/or DPPs investigated in the identified literature. Although the list is not exhaustive, I have struggled to find other studies who adopt a similar meso-investigation approach. This should be a positive sign that a meso-investigation of DPPs is a significant methodological as well as substantive contribution to knowledge.

Table 3 - A small, illustrative selection of literature reviews and empirical studies that investigate several DPPs, or several use-cases of a single DPP, including location of use-cases.

Study	Number of DPPs or use-cases	Type of DPP	Locations
Gün et al. (2019)	25 DPPs	Range of DPP types	Europe
Falco & Kleinhans (2018)	113 DPPs	Range of DPP types	Across the globe
Hasler et al. (2017)	48 DPPs	Range of DPP types	Across the globe
Desouza and Bhagwatwar (2014)	26 DPPs	Range of DPP types	16 most populous cities in the USA
Afzalan (2015)	N/A 107 planners surveyed	N/A	USA
Kahila-Tani et al. (2019)	200+ use-cases (Maptionnaire)	2D geoparticipation	Across the globe
Hjerpe et al. (2018)	10 cases (CityPlanner)	3D geoparticipation	Sweden
Brown & Kyttä (2014)	16 urban use-cases (Maptionnaire)	2D geoparticipation	Finland (mostly)
Sieber et al. (2016)	5 urban use-cases (bespoke applications)	2D geoparticipation	Canada
Touchton et al. (2019)	13 use-cases (cities' e-PB portals)	Participatory budgeting	Brazil

4.3.2 Literature review

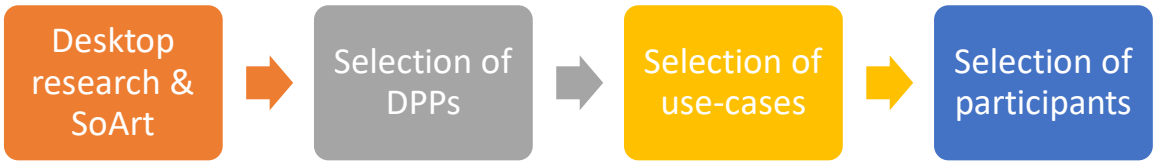
In order to identify and address the main socio-technical factors that influence the use of DPPs in urban planning, the literature review was cross-disciplinary. It centred on urban planning governance, web-based technologies for public participation, models of public participation, organisational innovation, Human Computer Interaction, and the literature on the different DPP technology types investigated in the thesis (e.g. PPGIS, various participatory ICTs, 3D participatory city models, e-Participatory Budgeting). The selection of publications for the literature was unsystematic and relied on purposive and snowball sampling. Broadly speaking, the reviewed literature could be classified as pertaining to urban planning processes and workflows on the one hand, and the conduct of public participation on the other.

4.4 Data collection & analysis

The research sample for the thesis is driven by technology type. The empirical evidence concerns a range of digital participatory platforms used in cities in the USA, Canada, the UK, France, Sweden, Finland, Iceland, Germany, the Netherlands and Australia. The type of digital platform technology guided the selection of cases rather than the type or location of urban planning projects. The platforms investigated in the thesis are presented in the Introduction to the Results chapters.

To begin with, the State-of-the-Art and desktop research led to the identification and selection of relevant DPPs that met the definition provided by (Falco & Kleinhans, 2018b) which then informed the identification and selection use-cases. The use-cases in turn determined the range of potential research participants, typically administrators/managers of the DPP projects. The concise diagram below illustrates the sequential sampling approach adopted for each use-case and research participant.

Figure 20 - Research process for the selection of DPPs, use-cases and research participants



The use of digital participatory platforms is investigated for two groups of actors. The first group concerns planning professionals who held different titles and responsibilities, depending on the use-case. They consisted of urban planners and community engagement practitioners working at local councils / municipalities or at planning consultancies, as well as elected officials with incumbent responsibilities for managing or closely overseeing digital participation. The second group concerned software providers, who were staff hired at private companies that distributed digital participatory platforms to local government or other planning-related organisations. The software companies either fully managed themselves or licensed the management and administration of the platforms to their customers in city agencies or urban planning consultancies.

The primary data consists of interview data and online survey data. Each data collection method (interview and online survey) is described individually below. The commonality between the two data collection methods is that they were ‘mirrored’, that is: they are similar, though not identical, in structure and content. Both surveys and interviews were semi-structured to enable respondents to answer in their own terms when responding to specific topics. Dual use of surveys and interviews enabled to make use of the advantages of both data collection method. All survey respondents were urban planning professionals (n=29). The remainder participated in the interviews (n=54). Therefore, 83 planning professionals participated in the research. All software providers (n=13) participated in the interviews.

The links to the online surveys were sent electronically to urban planning professionals in the period from December 2017 to March 2019. The interviews were conducted between September 2018 and August 2019 remotely by online calling or telephone, or face-to-face where possible. All interviews were audio-recorded and transcribed in the language in which they were conducted (i.e. English, French or Swedish). The collected data is primarily qualitative. The nature and number of primary data sources for the different cases was uneven. It comprised of interview and/or online survey

responses. The number of responses per planning organisation for each case varied between 1 and 3. Table 4 displays the number of responses per project as well as the roles of each respondent.

Table 4 - List and description of responses and respondent rules per DPP use-case

DPP	Name of project(s)	City - Client organisation	Country	N	Respondent role	Label	Type of response
Bagneux PB	Bagneux Participatory Budgeting	City of Bagneux	France	2	• Community engagement officers x2	• Bagneux-CE-officer1 • Bagneux-CE-officer2	interviews
Bang the Table	Be Heard Boulder	City of Boulder (CO)	USA	2	• Communications specialist • Digital communications engineer	• Boulder-Comms-Specialist • Boulder-DigitalComms-officer	interviews
Bästa Platsen	Tyck till om centrala Täby	Täby municipality	Sweden	2	• Urban planner & project leader • Communications officer	• Täby-UrbanPlanner • Täby-Comms-officer	survey
Bästa Platsen	Tyck till om Örebros grönområden	City of Örebro	Sweden	1	• Environmental planner	• Örebro-EnvironmentalPlanner	survey
Bästa Platsen	Tyck till om Skärholmen	City of Stockholm	Sweden	1	• Urban planner	• Skärholmen-UrbanPlanner	interview
Bästa Platsen	Tyck till om Hagsätra-Rågsved	City of Stockholm	Sweden	1	• Urban planner	• Hagsätra-UrbanPlanner	interviews
Cap Collectif	Montreuil Participatory Budgeting	City of Montreuil	France	2	• Community engagement manager • Community engagement officer	• Montreuil-CE-manager • Montreuil-CE-officer	interviews
Cap Collectif	La Fabrique Citoyenne	City of Rennes	France	3	• Community engagement manager • Community engagement officer • Community engagement intern	• Rennes-CE-manager • Rennes-CE-officer • Rennes-CE-intern	interviews
Cap Collectif	Clermont-Ferrand Participatory Budgeting	City of Clermont-Ferrand	France	1	• Community engagement officer	• Clermont-CE-officer	survey

Cap Collectif	idée.paris	City of Paris	France	1	• Community engagement officer	• Paris-CE-officer	Interview
Cap Collectif	La platforme participative de la Métropole grenobloise	Grenoble Metropolitan Agency	France	1	• Community engagement manager	• Grenoble-CE-manager	interview
Carticipe-Debatomap	PLUi Grenoble Métropole	Grenoble Metropolitan Agency	France	1	• Community engagement officer	• Grenoble-CE-officer	interview
Carticipe-Debatomap	Révision du PLU2	Lille Metropolitan Region	France	1	• Community engagement consultant	• Lille-CE-Consultant	interview
Carticipe-Debatomap	Destination Sherbrooke	City of Sherbrooke	Canada	1	• Senior touristic development officer	• Sherbrooke-Devt-senior	survey
Carticipe-Debatomap	Envies de Loire	Tours Metropolitan Region	France	1	• Environmental officer	• Tours-Envt-officer	survey
Citizens Foundation	Better Reykjavik (incl. My District)	City of Reykjavik	Iceland	1	• Community engagement officer	• Reykjavik-CE-officer	interview
CityPlanner	Tehtävä Leppävaarassa	City of Espoo	Finland	1	• Senior urban planner	• Espoo-UrbanPlanner-senior	survey
CityPlanner	Henriksdal planprogram	Nacka municipality	Sweden	2	• Senior urban designer • Urban designer & planner	• Nacka-UrbanDesigner-senior • Nacka-UrbanPlanner	interviews
CityPlanner	Teg centrum Stöcke	Umeå municipality	Sweden	1	• Senior communications manager	• Umeå-Comms-senior	interview
CityPlanner	Hur ser ditt Framtida Piteå ut?	Piteå municipality	Sweden	1	• Urban planner	• Piteå-UrbanPlanner	survey
CityPlanner	MinStad	City of Gothenburg	Sweden	2	• Senior geoinformation manager • Senior digital services manager	• Gothenburg-Geo-manager • Gothenburg-Digital-manager	interviews
Commonplace	Easton Priority Safer Streets	Bristol City Council	UK	2	• Project manager • Communications officer	• Bristol-Project-manager • Bristol-Comms-officer	survey

Commonplace	Streets for People (Heaton, Jesmond, Fenham)	Newcastle City Council	UK	2	• Senior commmunity engagement officers x 2	• NewcastleUK-CE-senior1 • NewcastleUK-CE-senior2	interview survey
Commonplace	Mini-Holland / Enjoy Waltham Forest (mainly Lea Bridge Road)	London Borough of Waltham Forest	UK	3	• Transport design consultant • Transport planner • Volunteer, cycling activist & expert	• WalthamForest-TransportConsultant • WalthamForest-TransportPlanner • WalthamForest-Volunteer	interviews
Commonplace	STAMP - Shad Thames & London Bridge Area Management Partnership	STAMP - Shad Thames & London Bridge Area Management Partnership	UK	1	• Senior community leader	• STAMP-Commy-leader	survey
Commonplace	Didcot Garden Town	South Oxfordshire and Vale of White Horse District Council	UK	1	• Project officer	• Didcot-Project-officer	survey
Commonplace	Spitalfields Neighbourhood Planning Forum	London Borough of Tower Hamlets	UK	2	• Senior community leader & senior comms expert • Urban planning officer	• Spitafields-Commy-leader• Spitalfields-UrbanPlanner	interviews
Commonplace	Connecting Leeds	Leeds City Council	UK	1	• Transport planning consultant	• Leeds-TransportConsultant	interview
coUrbanize	Ashland Downtown Planning Initiative	Town of Ashland (MA)	USA	1	• Assistant urban planner	• Ashland-UrbanPlanner	survey
coUrbanize	Kendall Square Redevelopment	Cambridge Redevelopment Authority (MA)	USA	1	• Program manager	• CambridgeMA-Prog-manager	survey
coUrbanize	East Lake Station	MARTA / cities of Atlanta - Decatur (GA)	USA	1	• Senior transport planner	•Atlanta-TransportPlanner-senior	survey
coUrbanize	Tewksburgy Community Vision Project	Town of Tewskbury (MA)	USA	1	• Assistant urban planner	Tewksbury-UrbanPlanner	survey
Decidim	OmaStadi (Helsinki Participatory Budgeting)	Helsinki	Finland	1	• Digital engagement officer	• Helsinki-DigitalEng-officer	interview

Decidim	La plateforme de participation citoyenne de la MEL	Lille Metropolitan Agency	France	1	• Senior community engagement officer	• Lille-CE-officer-senior	interview
Dessine-moi Toulouse	Dessine-moi Toulouse	Toulouse Metropolitan Agency	France	2	• Strategic projects manager • Elected official	• Toulouse-Project-manager •Toulouse-Elected-senior	interviews
Grenoble PB	Grenoble Participatory Budgeting	City of Grenoble	France	2	• PB officer • Elected official	• Grenoble-PB-officer • Grenoble-Elected-senior	interviews
Harava	Espoo Green Masterplan	city of Espoo	Finland	1	• Urban designer	• Espoo-UrbDesigner	interview
Flexite	Malmö initiativet	City of Malmö	Sweden	3	• Senior urban strategist • Senior communications officer • Communications officer	• Malmö-Strategist-senior • Malmö-Comms-officer-senior • Malmö-Comms-officer	survey interview interview
Mapping for Change	11,000 Homes	London Borough of Southwark	UK	1	• Urban planner	• Southwark-UrbPlanner	survey
Mapseed	Participatory Budgeting Durham	City of Durham (NC)	USA	1	• Participatory budgeting officer	• DurhamNC-PB-officer	interview
Maptionnaire	Helsinki Masterplan	City of Helsinki	Finland	1	• Senior communications manager	• Helsinki-Comms-senior	interview
Maptionnaire	Motorway scenarios	City of Jyväskylä	Finland	1	• Senior urban planner	• Jyväskylä-UrbanPlanner-senior	interview
Maptionnaire	C4P Hamburg	City of Hamburg & others	Germany	1	• Researcher & urban planner	• Hamburg-Researcher	interview
Maptionnaire	C4P Oxfordshire	Oxford County Council	UK	1	• Project manager	• Oxford-Project-manager	interview
Maptionnaire	Nikkilä Crowdsourcing heritage memories	Municipality of Sippo (Village of Nikkilä)	Finland	1	• Urban planner	• Sippo-UrbanPlanner	interview
Maptionnaire	Helsinki Walkability	City of Helsinki	Finland	1	• Urban planner	• Helsinki-UrbanPlanner	interview

MetroQuest	ARC Comprehensive Plan	Atlanta Regional Commission	USA	1	• Community engagement & communications manager	• Atlanta-CE-manager	interview
Myopencity	Je Participe Toulouse	City of Toulouse	France	1	• Community engagement officer	• Toulouse-CE-officer	interview
Neighborland	Dorothea Dix Park	City of Raleigh	USA	3	• Planning supervisor • Community engagement officer • Co-chair of Masterplan committee	• Raleigh-UrbanPlanner-senior • Raleigh-CE-officer • Raleigh-Advisory-chair	interviews
NYC PB	New York City Council Participatory Budgeting	New York City Council	USA	1	• Participatory budgeting officer	• NYC-PB-officer	interview
Paris PB	Paris Participatory Budgeting	City of Paris	France	1	• Participatory budgeting officer & researcher	• Paris-PB-officer	interview
PlaceChangers	Ouseburn	Ouseburn Trust (& Newcastle City Council)	UK	1	• Communications officer	• Ouseburn-Comms-officer	interview
Social Pinpoint	Don Mills Crossing: Community Building at Don Mills and Eglinton	City of Toronto	Canada	1	• Assistant urban planner	• Toronto-UrbanPlanner	survey
Social Pinpoint	Comprehensive Plan update	White Bear Township	USA	1	• Senior spatial planner	• WhiteBear-Planner-senior	survey
Social Pinpoint	Haig Park masterplan	City Renewal Authority, ACT Government	Australia	1	• Community engagement manager	• ACTgov-CE-manager	survey
Social Pinpoint	Warners Bay	Lake Macquarie City Council	Australia	1	• Senior spatial planner	• LakeMac-Planner-senior	survey
Social Pinpoint	Draft Monash Open Space Strategy	City of Monash	Australia	2	• Senior strategic planners x 2	• Monash-Planner-senior1 • Monash-Planner-senior2	survey
Social Pinpoint	Beddington Heights	City of Calgary	Canada	1	• Environmental expert	• Calgary-Envt-expert	survey
Social Pinpoint	VicRoads Mordialloc	City of Ballarat- VicRoads Agency	Australia	1	• Community engagement officer	• VicRoads-CE-officer	survey

Social Pinpoint	Parking Strategy	Lake Macquarie City Council	Australia	1	• Urban economist	• LakeMac-Economist	survey
Stickyworld [now Convers]	Hexham Marketplace redesign	Hexham, UK	UK	2	• Senior urban designer • Elected official	• Hexham-UrbanDesigner • Hexhaum-Elected	interviews
Transform City	Amstel III	Amsterdam municipality	NL	1	• Project manager	• Amsterdam-Project-manager	survey

Recruitment for the interviews and surveys took place in the following ways: i) directly by email if their email address was publicly available online; ii) direct messaging through various publically available social media groups, pages and profiles (e.g. Facebook, LinkedIn); iii) online contact forms on identified organisations' websites; and/or iv) by telephone where telephone numbers were publically available for identified individuals or organisations. Often, several channels were used simultaneously.

The question items for both surveys and semi-structured interviews address themes identified in the State-of-the-Art. These encompass the five empirical research questions for the thesis, namely:

i) The objectives for engaging the public through digital participation

ii) The perceived influence of the digital platform on planning decisions

iii) The range of technological functionalities perceived as most and least useful, including: which missing functionalities would have been useful, and suggestions for potential improvements

iv) Other methods for public participation that were used alongside the platform

v) The main organisational and institutional factors that affected the use of the digital platform

Regarding the objectives for public participation (i), the related question item adopted categories featured on the Spectrum of Public Participation (SPP) (IAP2, 2014) (Question items 6 and 4 in the surveys and interviews, respectively). As discussed in Chapter 2, the SPP's predominant value is pragmatic as the different public participation categories are articulated from the perspective of community engagement practitioners. At the same time, its pragmatic value arguably limits its capacity for the critical analysis of participatory processes (Carson, 2008; Davis & Andrew, 2018). Due to its popularity among practitioners, and its resemblance to alternative models adopted by city agencies across the world, the IAP2 provides one of the most practical options for data collection among urban planning professionals, compared to more analytical alternatives available in the literature (Davis & Andrew, 2018; Nelimarkka et al., 2014).

As the design for the online surveys and semi-structured interviews differed slightly, they are presented in further detail below.

The survey featured a mix of open-ended and closed-ended questions to enable both inductive and deductive data analysis (see Table 5).

Table 5 - Online survey design with question items

Item	Survey question item (urban planners)	Question type	Main relevant themes
1	Why did you choose [platform name] over other platforms?	Multi-selection + "Other"	DPP adoption Organisational factors
2	Which functionalities on the platform were the most useful to mediate community engagement?	Open-ended	DPP features
3	Which functionalities on the platform were the least useful to mediate community engagement?	Open-ended	DPP features
4	Which functionalities that were missing on the platform would have been particularly useful to mediate community engagement?	Open-ended	DPP features
5	What was the nature of the project to which the platform was applied?	Multi-selection + "Other"	Project background
6	What was the general purpose of engaging local residents in the planning process? For example, below are categories provided by the International Association for Public Participation (IAP2): inform, consult, involve, collaborate, empower	Multi-selection + "Other"	Objectives for PP
7	How has the use of platform supported that goal?	Open-ended	DPP features
8	How has platform complemented other methods for public participation?	Open-ended	Tool ecosystem
9	To what extent has the engagement output of the platform influenced planning decisions?	5-point Likert scale + "Other"	Influence on planning
10	Which main trends affecting your organisation shape opportunities for public participation?	Multi-selection + "Other"	Organisational factors Institutional factors
11	How could digital participatory platforms further complement other methods for public participation in the future?	Open-ended	Tool ecosystem
12	Do you have any final comments about digital participatory platforms, participatory planning or this particular questionnaire survey?	Open-ended	Various themes addressed

A difference compared to the interview design concerns question item 9 (Perceived influence on planning decision) which adopts a 5-point Likert-scale ranging from *No influence* to *It Steered Planning Decisions*, and prompts participants to further explain their answer in an open-ended comment box. The online survey was sent to urban planning professionals. The planning professionals worked at planning organisations in cities in the following countries: the UK, France, Sweden, Finland, the Netherlands, Australia, the USA and Canada. The survey link was sent to 80 urban planning organisations. I contacted between 1 and 4 potential respondents in each organisation,

including some form of general enquiries where available, and/or communications officers managing the Facebook page of the planning organisation.

The semi-structured interview template adopted the general structure of the online survey. The semi-structured interviews were conducted following best-practice recommendations by Brinkmann and Kvale (2018). The value of semi-structured interviews is that they enable to focus on themes and experiences that directly match participants' experience and use of language for inductive text analysis, while observing a pre-determined frame of enquiry to perform deductive analysis. The interview questions for each group of respondents are listed in Table 6.

Table 6 - Interview design with question items

Item	Interview question items (planners)	Interview question items (software providers)	Main relevant themes
1	Who decided to adopt the platform? Was there political support for the adoption of the platform? Was there any resistnace from elected officials or other staff?	Which planning organisations tend to procure the platform? Is there often political support for the adoption of the DPP in local government? Any resistance?	DPP adoption Organisational factors Insitutional factors
2	Why did you choose this particular platform? What were your selection criteria?	What are planning organisations' needs and requirements when selecting DPPs like yours?	DPP adoption Organisational factors
3	Which functionalities were most useful for engaging citizens? Which were least useful? Which missing functionalities would have been most useful?	Which functionalities are most useful or least useful for engaging citizens through the platform?	DPP features
4	What was the general aim for engaging local residents in the planning process? For example, below are categories provided by the International Association for Public Participation (IAP2): inform, consult, involve, collaborate, and empower	What is the general aim for engaging citizens with the platform? For example, below are categories provided by the International Association for Public Participation (IAP2): inform, consult, involve, collaborate, and empower	Objectives for PP
5	How did citizens perceive the use of the platform? Did you receive any feedback from them?	How do citizens tend to perceive your platform? Have you received any feedbakc from urban residents who participated on the platform?	Influence on planning DPP features Institutional factors
6	To what extent were certain groups of urban residents underrepresented or overrepresented on the platform?	To what extent are certain groups of urban residents underrepresented or overrepresented on the platform?	Instutional factors Organisational factors
7	Which main organisational issues did you face (e.g. time, skills, budget, analysis of incoming comments)?	Which main organisational issues do planning organisations face (e.g. time, skills, budget, analysis of incoming comments)?	Organisational factors
8	How did the use of the platform complement other methods for public participation?	How is the platform used alongside other methods for public participation?	Tool ecosystem
9	How have the citizen input on the platform influenced planning decisions? Are there any community engagement summaries / Have you provided any feedback to the public?	Have you identified trneds in how citizen input on the platform tends to influence planning decisions?	Influence on planning Organisational factors Institutional factors
10	How could digital platforms further complement the use of other methods for public participation in the future? Do you have any other comments about the platform or the participatory planning project?	How could digital platforms further complement the use of other methods for public participation in the future? Which new technological developments are expected for the platform?	DPP features Tool ecosystem

The interview differs from the survey regarding question item 9 on the interview and survey templates (i.e. Perceived influence on planning decisions). The interview prompted participants for their own

answers in their own words. They were not administered the 5-point Likert-scale as was the case for the online survey. Instead, the interview participants were encouraged to provide an order of scale of their personal choosing to express the extent to which they viewed that the digital participatory platform had influenced planning decisions.

The interviews were either conducted face-to-face, or remotely by phone or online (e.g. by Skype). I conducted the interviews in English, French or Swedish, depending on the project. All interviews were recorded with participants' consent and transcribed by myself in the language of the interview.

All the surveys and interview responses were then coded and analysed in Nvivo 12 using the same code architecture. Thematic analysis was conducted using an interpretive social constructivist approach (Miles & Huberman, 1994). Clarke and Braun (2017, p. 297) describe thematic analysis (TA) as

> A method for identifying, analysing, and interpreting patterns of meaning ('themes') within qualitative data.

They further describe TA as a flexible tool that can be incorporated in many different forms of theories and epistemologies and can be applied to small and large data sets alike. Pre-structured code architectures will favour deductive research, for example derived from literature reviews. Inductive coding, on the other hand, will enable to explore 'new terrain' that can complement or augment deductive code architectures. The semi-structured pattern of the online surveys and interviews facilitated dual inductive and deductive coding. The coding and reviewing process is an organic process (Nowell, Norris, White, & Moules, 2017). Reliability in the coding, or the degree of fitness between codes and the data, can be checked by ensuring that the derived themes are firmly grounded in the data. To conduct trustworthy thematic analysis, Nowell et al. (2017) suggest six phases: i) becoming familiar with the data; ii) generating initial codes; iii) searching for themes; iv) reviewing the themes; v) defining and naming themes; and vi) producing the report. Where possible, researcher triangulation and team analysis should support the stages from generating initial codes all the way to the naming of the themes. Given the research constraints of a PhD, this is most effective when research teams conduct research together and can meet on a regular basis to discuss common research efforts.

Observing the above recommendations, and given the mirrored semi-structured design of the surveys and interviews, I pursued deductive thematic analysis (derived from the structured elements of the data collection, anchored in insight from the reviewed literature) *alongside* inductive thematic analysis (emerging from respondents' self-directed input). The coding process was organic because iterative. The deductive themes provided the core structure for thematic analysis and guided the structure for the thesis. Inductive themes, on the other hand, led to the emergence of common sub-

themes across the different investigated cases. Although a semi-structured data collection process necessarily frames the way data can be interpreted, the emerging sub-themes also helped to strengthen *as well as* provide original nuance to the deductive thematic structure. The emerging themes particularly highlighted the interdependence and thematic hybridity between the structuring deductive themes, constituting a major contribution to knowledge in-and-of-itself. Taking a further step back from the analysed data, a handful of key research findings emerged as core exploratory themes that deserve further investigation in future research.[18]

4.5 Ethical considerations

First, the standard, prescribed institutional code of research conduct was strictly adhered to. Ethical approval was obtained from Northumbria University to conduct the online interviews and semi-structured interviews, in accordance the university's research policy[19], the GDPR and the UK Data Protection Act 2018[20]. Both the consent forms, online survey content and interview content were approved by Northumbria University's research ethics board. All survey and interview data files are stored securely and will be kept for a duration of five years to enable longitudinal comparative analysis, should the opportunity arise. All data will be destroyed permanently following the five-year data storage period. The name of participants is kept anonymous. Participation in the research required participants' consent. The planning professionals and software providers were not a sensitive group of participants. In the rare event where commercially or professionally sensitive information, this information was not shared. All the personal details provided by respondents are confidential.

Relating more specifically to the research area at hand, I strove to be mindful of the potentially commercially and politically sensitive nature of the data collected from my research participants. Although all the reviewed projects are public in nature, and the vast majority of views expressed were not sensitive, policymaking in local government is inherently contentious and fraught with conflict and agonism. Policies that pertain to urban planning are no exception. Both city agencies and software providers may compete amongst each other in various ways, and urban planning professionals across cities may have diverging views as to what constitutes effective public participation. The latter may

[18] These include the exploratory lifecycles for digital participatory platforms (Section 10.8) and the advocacy views observed among a majority of software providers about local participatory processes in urban planning.

[19] Northumbria University's research policy https://northumbria-cdn.azureedge.net/-/media/corporate-website/new-sitecore-gallery/research/documents/pdf/ethics-handbook-sections/ethics-in-research-policy-statement-2017-18.pdf?modified=20190813083055&la=en&hash=B7ED2B6E104DA660D24E8D521ED0D172A17653A3 [accessed 29 October 2019].

[20] https://www.gov.uk/government/collections/data-protection-act-2018 [accessed 29 October 2019].

also build their personal career and gather critical insight across a range of different cities. Additionally, relationships between clients in planning agencies and software providers can yield dissatisfaction. I therefore kept insightful critical responses fully anonymous to enable critical analysis while safeguarding respondents from potential discomfort. As a further ethical step, survey respondents were asked for consent about the possibility of quoting their responses, while interview respondents were contacted prior to thesis publication regarding verbatim quotations, to ensure these aligned with their intentions and expressed views.

4.6 Summary of methodology

This chapter reiterates some of the main knowledge gaps in the literature about the use of digital participatory platforms (DPPs) in urban planning as part of the problem statement. It then lays out the scope of the thesis, including the types of technologies not investigated in the thesis which do not meet the definition of DPPs provided by Falco and Kleinhans (2018b). The main five research questions that guide the research design for data collection are articulated as:

RQ1. Which objectives for public participation do DPPs enable?

RQ2. Which levels of influence on urban planning decisions do DPPs enable?)

RQ3. Which technological features on DPPs are perceived as most useful?

RQ4. How do DPPs complement other tools for public participation?

RQ5. Which main organisational and institutional factors affect the adoption and use of DPPs in urban planning?

Building on those five research questions and the associated empirical data, a sixth research question is formulated to help re-theorise the use of DPPs in urban planning to better account for and utilise their socio-technical hybridity in planning research and practice. This theoretically-focused research question is articulated as:

RQ6. How can the use of DPPs be theorised to better reflect their hybrid use in urban planning?

To meet these research objectives, a qualitative meso-investigation was deemed most appropriate. The meso approach rests on the investigation of a number of DPP use-cases that is significantly larger than that possible through case studies, but inferior in number to that characterised by large-scale quantitative, statistically significant surveys. One of the main rationales for a qualitative meso-investigation is the inherent difficulty in establishing an absolute sample of either DPPs, DPP use-cases or planning professionals who manage DPP applications. The sample of DPP use-cases was technology-led rather than led by type or geographic location of planning project. The State-of-the-Art and desktop research helped identify and select suitable DPPs, for which use-cases and associated

planning professionals who manage these DPP applications were identified and selected. The main sampling approach was therefore purposive.

In terms of data collection methods, the research utilises both semi-structured online surveys and semi-structured interviews to help make best use of both data collection method. Respondents were provided this choice between surveys and interviews so they could respond in a way that could fit their busy workloads and their personal preferences. The meso-level investigation complements the scant existing studies that also aim to gain insight about a range of DPPs in urban planning. The overall research design and collection of data received ethical approval, and strict conducts of professional research were adhered to throughout the different research stages: obtaining of consent approval from research participants, data collection, data storage, data analysis and reporting.

Having laid out the methodological foundation for the qualitative meso-investigation, the thesis now turns to the Introduction to the Results chapters.

5 Results: Introduction to the platforms and use-cases

5.1 Introduction

This chapter presents a heuristic categorisation and short description of the DPPs and an overview of the associated use-cases investigated in the thesis. The chapter begins by establishing categories for DPP, based on the identification of platforms in the State-of-the-Art as well as desktop research conducted between October 2015 and June 2019. The review of platforms focused on platforms that are distributed commercially and used in urban planning processes led by local councils / municipalities. On the basis of the DPP categorisation, the chapter then presents an overview of the 25 platforms and 61 use-cases investigated in the thesis. It provides the range of identified functionalities and brief descriptions of two typical examples for each platform type. The chapter concludes with a brief summary of the categorisation and overview of platforms and use-cases.

5.2 Categorisation & description of digital participatory platforms

Based on the literature review and extensive desktop research conducted between 2015 and 2019, I provide the following heuristic fourfold categorisation of the DPPs: i) 3D geoparticipation platforms; ii) 2D geoparticipation platforms; iii) Generalist/multifunctional platforms; and iv) bespoke participatory platforms. Table 7 provides an overview of the platforms and classifies particular use-cases investigated in the thesis according to the most fitting category. The table also indicates typical participatory functionalities for end-users (i.e. urban residents participating on the platform) and potential overlaps between the platform categories.

Table 7 - Categorisation of DPPs with associated typical functionalities, investigated platforms and associated use-cases

Platform type	Typical participatory functionalities	Category overlaps	Investigated platforms	Reviewed cases
3D Geoparticipation	• 3D geovisualisation • Insert 3D volumes • Draw polygons & lines • Ideation & commenting • Symbolic visualisation of contributions	• Multifunctionality (e.g. SM sharing, information)	CityPlanner MinStad	Espoo, Nacka, Umeå, Piteå Gothenburg
2D Geoparticipation	• 2D geovisualisation • Ideation, commenting • Map-based surveys • Questionnaires • Symbolic visualisation of contributions	• Multifunctionality (e.g. SM sharing, information, project updates, timelines) • Mulltiple projects, some w/out map (e.g. coUrbanize, Commonplace)	Bästa Platsen Carticipe Commonplace Maptionnaire Mapping for Change PlaceChangers Social Pinpoint TransformCity Harava	Rågsved, Skärholmen, Täby, Örebro Grenoble metro, Lille, Tours, Sherbrooke Spitalfields, STAMP Hamburg, Oxford, Helsinki, Nikkilä, Jyväskylä Southwark Ouseburn (Newcastle) White Bear Township, Calgary, Toronto, ACT, Lake Macquarie, Monash, VICRoads Amsterdam Espoo
Generalist multifunctional	• Multiple projects • Extensive information • Ideation, commenting, voting, deliberation • Timelines, updates, in-person events	• 2D geoparticipation (e.g. Stickyworld, Bang the Table) • Bespoke uses (e.g. Cap Collectif)	Bang the Table Cap Collectif Commonplace coUrbanize Decidim MetroQuest Myopencity Neighborland Stickyworld Neighborland	Boulder Rennes, Idée Paris, Grenoble metro, Clermont-Ferrand Waltham Forest, Didcot, Newcastle, Bristol, Leeds Cambridge (MA), Ashland, Tewksbury, Atlanta-Decatur Lille, Helsinki Atlanta metro Toulouse Raleigh Hexham Raleigh
Bespoke	• Participatory Budgeting • Ideation, collaboration • e-Petitions	• Generalist platforms • 2D geoparticipation (e.g. Mapseed)	Cap Collectif Citizens Foundation Malmö initiativet Mapseed Specialist / In-house	Montreuil, Rennes Reykjavik Malmö Durham (NC) Grenoble, Paris, Toulouse, Bagneux, NYC

The rationale for developing the categorisation is to provide a descriptive classification of platforms based on their main use-value, as befits the sample of platforms and use-cases for this thesis. Given the unique research design of this thesis, a matching fourfold categorisation was needed. As presented in the State-of-the-Art, Falco and Kleinhans (2018b) devise their own fourfold categorisation of platforms based on the main type of citizen-government relationship afforded by the platform: i) *information sharing* (i.e. one-way communication from government to citizens); ii) *interaction* (i.e. two-way communication); iii) *co-production* (i.e. two-way interaction characterised by civic engagement, involvement, collaboration); and iv) *self-organisation* (i.e. community-initiated to engage with government or among community members). The latter arguably covers the whole landscape of digital platforms currently used for citizen participation in spatial planning. The State-of-the-Art also presents 13 alternative models of digital participation. Each model comes with its own primary focus. Although the models each consider multiple dimensions, none seem to provide a comprehensive enough thematic coverage of all the main socio-technical factors that affect the use of DPPs. The main aim here is to investigate the use of DPPs in urban planning by way of five cross-cutting dimensions: i) the objectives for public participation; ii) the perceived influence of DPPs on planning decisions; iii) the most useful DPP features; iv) other tools for public participation that complement DPPs; and v) the main organisational and institutional factors. The investigation thereby also aims to provide empirical substantiation for a theory of DPP hybridity that better takes stock of the interdependencies between the various socio-technical factors that determine the use of DPPs in urban planning.

Importantly, and in contrast to Falco and Kleinhans (2018b), the selection of DPPs for the categorisation presented here goes beyond simple information sharing. The premise for this thesis is that information sharing is not a form of participation in-and-of-itself. Therefore, platforms that are only informational would not befit the term DPP but should instead be considered 'informational'. This is not to say that an important component of DPPs cannot be informational. A DPP proper must also explicitly facilitate some of the other categories on the IAP2 Spectrum, or 'interaction' and 'co-production' as based on the categorisation provided by Falco and Kleinhans (2018b). Furthermore, this thesis does not consider platforms that focus on community self-mobilisation, self-organisation or independence. This therefore rules out all corresponding platform categorisations (e.g. Falco & Kleinhans, 2018b; Møller and Olafsson, 2018; Gün et al., 2019). In contrast, the categorisation suggested here is heuristic and pragmatic. It does not seek to provide a definitive or exhaustive

nomenclature of DPP technologies.[21] This makes the categorisation descriptive and flexible enough to cover a significant pane of digital participatory platforms used in urban planning.

The proposed categorisation accounts for the main focus of the platform types. DPP technologies being versatile, flexible and customisable, they all display varying ranges of functionalities (Desouza & Bhagwatwar, 2014; Falco & Kleinhans, 2018b; Gün et al., 2019). As such, DPPs can share elements with other categories. In particular, there can be overlaps between 2D geospatial platforms and generalist multifunctional platforms (e.g. *Social Pinpoint*, *Commonplace*). Platforms like *Commonplace*, *coUrbanize* and *Bang the Table* provide varying levels of geoparticipation as part of a wider multifunctional platform. Some platforms (e.g. *Commonplace*) lean more strongly on the 2D geoparticipation side than platforms whose geoparticipation functionalities may be more limited or basic (e.g. *Bang the Table*). However, since *Commonplace* is often used for engagement projects and activities that do not require any advanced spatial component, geoparticipation is not systematically used on *Commonplace* applications. *Social Pinpoint* also shares features with generalist/multifunctional. *Social Pinpoint* can also facilitate participatory budgeting, idea walls, and a portal page for all engagement projects, but its primary strength and use at the time of writing the thesis was geoparticipation. Both *coUrbanize* and *Commonplace* feature project updates, extensive project descriptions, and other non-spatial functionalities that can support almost the full life cycle of a digital participatory project, which makes them better candidates for the 'generalist/multifunctional' category.

Generalist platforms can also be customised as bespoke participatory platforms. For example, the generalist *Cap Collectif* platform is often only used by city agencies in France for participatory budgeting (e.g. Montreuil, Clermont-Ferrand in its first year of use). Other French cities have used *Cap Collectif* for a wider range of public consultations even though the platform may remain strongly associated with participatory budgeting (e.g. Rennes). Likewise, *Citizens Foundation* is a generalist platform, enabling various forms of deliberation and public consultations and e-Petitions (or e-Interpellations of city council boards), but its use in Reykjavik has been largely associated with participatory budgeting. The bespoke platforms used for the two US participatory budgeting cases reviewed here (Durham and NYC) both provide 2D geoparticipation.

Looking at individual engagement projects, *Commonplace* projects in locations such as Newcastle or Waltham Forest appeared more multifunctional (e.g. supporting early geoparticipation as well as later

[21] The research accepts that since the desktop research was completed other DPP may been developed to offer capabilities that were not present during the survey process. Therefore, this survey should not be deemed as a definitive study.

design proposal evaluations that lacked geoparticipation) than in cases like Spitalfields where the 2D geoparticipation component dominated. In effect, all *Commonplace* cases reviewed in the thesis could be clustered as distinctively 2D geoparticipation, relative to the other platforms which lack any geoparticipation component (e.g. *Neighborland, Cap Collectif*).

Although platform categories may overlap, typical participatory functionalities (i.e. concerning the end-user interface for participants/residents) apply. Below are concise descriptions of each platform type.

3D geoparticipation platform enables a wide range of geoparticipation functionalities centred on 3D visualisation and interaction between end-users: drawing and insertion of 3D volumes, ideation, commenting, "liking"/endorsing other ideas, thematic visualisation of information and comments, as well as text-based questionnaires. The investigated platform (*CityPlanner*, and its adaptation as *MinStad* in Gothenburg) does not feature any back-end data management and analysis tool. However, a back-end design tool enables planning professionals in client organisations to customise their own online engagement projects. The data requirements for individual platform applications are greater than for the other platforms, in that client organisations need to purchase and/or collect 3D data in-house. 3D data production can rely on multiple data sources, such as aerial photography, remote sensing, on-the-ground laser scanning, drone-based laser scanning, and 3D modelling in urban design software (Alatalo et al., 2017; Benner, Geiger, Gröger, Häfele, & Löwner, 2013; Filip Biljecki et al., 2015; Müller Arisona, Zhong, Huang, & Qin, 2013; Ohori, Ledoux, Biljecki, & Stoter, 2015). As part of a software package, *CityPlanner* is also widely used by planning organisations for internal project management and externally for 3D visualisation & communication about planning projects with the general public.

2D geoparticipation platforms are centred on map-based engagement. They often include varying degrees of text-based questionnaire (e.g. more elaborate on *Maptionnaire*, more basic on *Bästa Platsen* and *Carticipe*). The ability to see other participants' contributions is more systematic on some platforms than others (e.g. *Carticipe*, *coUrbanize*, *Social Pinpoint*, *Mapping for Change*, *Commonplace*). *On the end-user side*, common functionalities include: coloured place markers, icon/theme-based place markers, multiple base map layers, commenting, commenting other users' ideas and comments, ideation, 'liking'/endorsing/voting other users' ideas and comments, media uploads (i.e. pictures, hyperlinks), and real-time or post-projects statistics about participation activity on the platform (e.g. number of registered users, number of comments, votes/'likes'). *On the platform administration side*, platforms that have a back-end design tool (e.g. *Maptionnaire*, *Social Pinpoint*) can enable planning professionals in client organisations to design the overall engagement project by customising the appearance and layout of the engagement project, uploading their own base maps, customising the extent of the map, designing their own text-based and map-based surveys.

Generalist/multifunctional platforms typically function as engagement portals for client organisations or as engagement platforms for a wide range of related projects. Some generalist platforms seem to provide all identifiable participatory functionalities on other DPPs (e.g. *Decidim*) with the exception of 3D geoparticipation. Generalist/multifunctional platforms provide a broader range of functionalities than other platform types. They all provide a back-end design tool for platform administrators in client planning organisations to design both the content and layout of engagement projects. The back-end interface also usually features various levels of data analysis (e.g. *Bang the Table, Commonplace, Neighborland*). The types of citizen input data analysis can include advanced querying and filtering functionalities, natural language analysis based on artificial intelligence, activity summary charts/diagrams, and push-button reports. *Stickyworld* stands out as an all-purpose collaboration platform, as opposed to the rest of the platforms reviewed here, which focus more specifically on community engagement. Its wide range of tools makes it a generalist/multifunctional platform.

Bespoke platforms denote different types of platforms that do not fit in the other three categories. They primarily concern two types of platforms. The first type denotes platforms that are more focused in their use, such as participatory budgeting, collaboration or e-Petitions. The second type denotes one-off applications that are developed in-house or in close collaboration with planning organisations' regular ICT supplier, often for a specific purpose. Among others, these include the participatory budgeting in Paris, Grenoble, Bagneux; the engagement portal at the city of Toulouse; and the engagement and collaboration platform at Toulouse metro. The participatory budgeting at New York City (NYC) is combination of a mapping platform (*PoePublic*) and a voting platform (*D21*). Bespoke platforms such as the engagement portal at the city of Toulouse can grow over time to include other functionalities, based on staff requests by planning professionals to the IT supplier. Bespoke platforms can be both focused in their use and developed 'in-house' by planning organisations.

Platform licensing. An additional note concerns platform licensing, as these emerged as an important component in the findings from planning professionals and software providers. In terms of platform distribution, two main licensing modes are apparent across platform type: i) *a proprietary software licence,* often leveraged as Software as a Service (SaaS) (Choudhary, 2007; Dubey & Wagle, 2007) with unlimited projects within a contractually determined time period; and ii) *an Open Source model,* with Open Source coding made readily available on repositories such as GitHub. Open Source platforms generally require third party IT or engagement consultancies, or software developers themselves, to customise applications for client organisations. Platforms may also be developed by city agencies themselves in collaboration with their IT suppliers. Several software providers are non-profit enterprises (e.g. *Neighborland, Citizens Foundation*).

To conclude, readers are invited to review the brief text descriptions of each individual DPP investigated in the thesis in Appendix 2 if they should so wish.

5.3 Concise overview of the use-cases

The thesis utilises data obtained from a total of 61 use-cases, concerning 25 platforms. The use-cases investigated in the thesis are listed in Table 8.

Table 8 - List of reviewed use-cases

Digital platform(s) used	**Name of project(s)**	**City - Client organisation**	**Country**	**Theme of the urban planning project(s)**	**Project year**	**Project URL (valid as of Dec 2019)**
Bagneux Participatory Budgeting	Bagneux Participatory Budgeting	City of Bagneux	France	Participatory Budgeting	Launched 2018	http://budgetparticipatif.bagneux92.fr/
Bang the Table	Be Heard Boulder	City of Boulder (CO)	USA	Various consultations	Launched 2018	https://www.beheardboulder.org/about
Bästa Platsen	Tyck till om centrala Täby	Täby municipality	Sweden	Comprehensive plan for city centre	2015-2016	http://dialog.spacescape.se/taby/
Bästa Platsen	Tyck till om Örebros grönområden	City of Örebro	Sweden	Parks and recreation	2016	http://dialog.spacescape.se/orebro/
Bästa Platsen	Tyck till om Skärholmen	City of Stockholm	Sweden	Urban regeneration	2016	http://dialog.spacescape.se/skarholmen/
Bästa Platsen	Tyck till om Hagsätra-Rågsved	City of Stockholm	Sweden	Urban regeneration	2016-2017	http://dialog.spacescape.se/hagsatraragsved/
Cap Collectif	Montreuil Participatory Budgeting	City of Montreuil	France	Participatory Budgeting	Launched 2015	https://budgetparticipatif.montreuil.fr/
Cap Collectif	La Fabrique Citoyenne	City of Rennes	France	Participatory Budgeting & Various consultations	Launched 2015	https://fabriquecitoyenne.rennes.fr/

Cap Collectif	Clermont-Ferrand Participatory Budgeting	City of Clermont-Ferrand	France	Participatory Budgeting & Various consultations	2018	https://clermontparticipatif.fr/
Cap Collectif	idée.paris	City of Paris	France	Various consultations	Launched 2018 (tbc)	https://idee.paris.fr/
Cap Collectif	La platforme participative de la Métropole grenobloise	Grenoble Metropolitan Agency	France	Various consultations	2016	https://participation.lametro.fr/
Carticipe-Debatomap	PLUi Grenoble Métropole	Grenoble Metropolitan Agency	France	Comprehensive plan	2016 and 2017-2018	http://plui-lametro.carticipe.fr/
Carticipe-Debatomap	Révision du PLU2	Lille Metropolitan Region	France	Comprehensive plan	2016-2017	http://jecarticipe.lillemetropole.fr/
Carticipe-Debatomap	Destination Sherbrooke	City of Sherbrooke	Canada	Touristic development	2015	N/A summary in French: https://carticipe.net/tag/sherbrooke/
Carticipe-Debatomap	Envies de Loire	Tour Metropolitan Region	France	Waterfront development competition	2017	http://enviesdeloire.carticipe.com/
Citizens Foundation	Better Reykjavik (incl. My District)	City of Reykjavik	Iceland	Participatory Budgeting & agenda-setting	Launched 2011	https://betrireykjavik.is/domain/1
CityPlanner	Tehtävä Leppävaarassa	City of Espoo	Finland	Regeneration / District zoning	2016, 2017	http://legacy.cityplanneronline.com/cityplanner/project/webgl/index.do?uid=mZtuKSm3&lang=en
CityPlanner	Henriksdal planprogram	Nacka municipality	Sweden	Comprehensive plan / Local plan	2013-2014 & 2017	2017 survey: http://cityplanneronline.com/Nackakommun/planprogramhenriksdal

CityPlanner	Teg centrum Stöcke	Umeå municipality	Sweden	Local plan & Experimental consultations	2018	Stöcke: https://cityplanneronline.com/app/mobile.html?mapmode=3d&first=false&id=UmeKommun%2Fstocke / Teg Centrum: by invitation only.
CityPlanner	Hur ser ditt Framtida Piteå ut?	Piteå municipality	Sweden	Masterplan	2016-2018	http://beta.cityplanneronline.com/cityplanner/project/webgl/index.do?uid=9kUa0D0v
CityPlanner (MinStad)	MinStad	City of Gothenburg	Sweden	Masterplan	Launched 2012	http://minstad.goteborg.se/minstad/index.do
Commonplace	Easton Priority Safer Streets	Bristol City Council	UK	Active mobility & streetscape design	2017	https://easton.commonplace.is/comments
Commonplace	Streets for People (Heaton, Jesmond, Fenham)	Newcastle City Council	UK	Active mobility & streetscape design	2016	Heaton: https://heatonouseburn.commonplace.is/ Jesmond: https://jesmond.commonplace.is/ Fenham: https://arthurshillfenham.commonplace.is/
Commonplace	Mini-Holland / Enjoy Waltham Forest (mainly Lea Bridge Road)	London Borough of Waltham Forest	UK	Active mobility & streetscape design	2015	https://leabridgeroad.commonplace.is/
Commonplace	STAMP - Shad Thames & London Bridge Area Management Partnership	STAMP - Shad Thames & London Bridge Area Management Partnership	UK	Community map & celebration of local assets	2018	https://placemarks.commonplace.is/about
Commonplace	Didcot Garden Town	South Oxfordshire and Vale of White Horse District Council	UK	Masterplan	2017	https://didcotgardentown.commonplace.is/comments
Commonplace	Spitalfields Neighbourhood Planning Forum	London Borough of Tower Hamlets	UK	Neighborhood Plan (community-led)	2017-2018	https://spitalfields.commonplace.is/
Commonplace	Connecting Leeds	Leeds City Council	UK	Sustainable transport & streetscape design	2018	https://leedstransportmap.commonplace.is/

coUrbanize	Ashland Downtown Planning Initiative	Town of Ashland (MA)	USA	Comprehensive plan / Local plan	2017	https://courbanize.com/projects/ashlanddowntown/comaps/48
coUrbanize	Kendall Square Redevelopment	Cambridge Redevelopment Authority	USA	Regeneration	2018	https://courbanize.com/projects/mit-kendall-square/information
coUrbanize	East Lake Station	MARTA / cities of Atlanta - Decatur (GA)	USA	Transit Oriented Development (TOD)	2017-2018	https://courbanize.com/projects/east-lake-station/comaps/47
coUrbanize	Tewksburgy Community Vision Project	Town of Tewskbury	USA	Vision plan	2017	https://courbanize.com/projects/tewksbury-vision/comaps/37
Decidim	OmaStadi (Helsinki Participatory Budgeting)	Helsinki	Finland	Participatory budgeting	2018-2019	https://omastadi.hel.fi/?locale=en
Decidim	La plateforme de participation citoyenne de la MEL	Lille Metropolitan Agency	France	Various consultations	Since 2017	https://participation.lillemetropole.fr/
Dessine-moi Toulouse	Dessine-moi Toulouse	City of Toulouse	France	Collaborative development & retrofits	2018-2019	https://dessinemoitoulouse.fr/
Grenoble Participatory Budgeting	Grenoble Participatory Budgeting	City of Grenoble	France	Participatory Budgeting	Launched 2014	https://www.grenoble.fr/552-budget-participatif.htm
Harava	Espoo Green Masterplan	city of Espoo	Finland	Parks and recreation	2014	https://query.eharava.fi/1034?lang=en#
Malmö initiativet	Malmö initiativet	City of Malmö	Sweden	e-Petition / Citizen proposals	Launched 2008	https://malmo.flexite.com/malmo_fp/listview/3GLM

Mapping for Change	11,000 Homes	London Borough of Southwark	UK	11,000 Council homes	2015	https://southwark.communitymaps.org.uk/welcome
Mapseed	Participatory Budgeting Durham	City of Durham (NC)	USA	Participatory Budgeting	Launched 2018	https://pbdurham.mapseed.org/10.20/35.97690/-78.88370
Maptionnaire	Helsinki Masterplan	City of Helsinki	Finland	Master Plan	2013	Survey results on map: http://yleiskaava.maptionnaire.com/en/
Maptionnaire	Motorway scenarios	City of Jyväskylä	Finland	Road and mobility infrastructure	2017	https://app.maptionnaire.com/fi/1378/
Maptionnaire	C4P Hamburg	City of Hamburg & others	Germany	Active mobility solutions & Sustainable transport	2017	https://cities4people.eu/pilot-areas/hamburg-de/
Maptionnaire	C4P Oxfordshire	Oxford County Council	UK	Sustainable transport	2017	https://app.maptionnaire.com/en/3247/
Maptionnaire	Nikkilä Crowdsourcing heritage memories	Municipality of Sippo (Village of Nikkilä)	Finland	Heritage planning	2016	N/A summary: https://maptionnaire.com/customer-stories-list/sipoo
Maptionnaire	Helsinki Walkability	City of Helsinki	Finland	Active mobility (Walkability study)	2018	https://app.maptionnaire.com/fi/4140/
MetroQuest	ARC Comprehensive Plan	Atlanta Regional Commission	USA	Comprehensive plan	2015	N/A Community engagment evaluation available here: https://atlantaregionsplan.org/community-engagement/
Myopencity	Je Participe Toulouse	City of Toulouse	France	Various consultations	Launched 2018	https://jeparticipe.toulouse.fr/

Neighborland	Dorothea Dix Park	City of Raleigh	USA	Park and Recreation	2017-2019	https://neighborland.com/dixpark
NYC Participatory Budgeting	New York City Council Participatory Budgeting	New York City Council	USA	Participatory Budgeting	Launched 2012 (tbc)	https://shareabouts-pbnyc-2018.herokuapp.com/page/about
Paris Participatory Budgeting	Paris Participatory Budgeting	City of Paris	France	Participatory Budgeting	Launched 2014	https://budgetparticipatif.paris.fr/bp/
PlaceChangers	Ouseburn	Ouseburn Trust (& Newcastle City Council)	UK	Heritage Planning	2017	N/A
Social Pinpoint	Don Mills Crossing: Community Building at Don Mills and Eglinton	City of Toronto	Canada	Active mobility, Parks and recreation	2017	https://toronto.mysocialpinpoint.com/donmillscrossingpublicrealmplan?_ga=2.241782785.261923191.1503421248-1837466087.1503421248
Social Pinpoint	Comprehensive Plan update	White Bear Township	USA	Comprehensive Plan	2018	https://hkgi.mysocialpinpoint.com/white-bear-township
Social Pinpoint	Park masterplan	City Renewal Authority, ACT Government	Australia	Masterplan & Local plan	2018	https://www.yoursay.act.gov.au/haigpark/community-engagement-phase-1-2
Social Pinpoint	Warners Bay	Lake Macquarie City Council	Australia	Masterplan & Local plan		https://www.lakemac.com.au/development/city-planning/strategic/warners-bay
Social Pinpoint	Draft Monash Open Space Strategy	City of Monash	Australia	Park and Recreation	2017	https://monash.mysocialpinpoint.com/open-space-strategy?_ga=2.161963899.693205616.1509720901-301598461.1509720901
Social Pinpoint	Beddington Heights	City of Calgary	Canada	Park and Recreation	2015-2016	https://beddington.mysocialpinpoint.com/beddington-heights-parks#/

Social Pinpoint	VicRoads Mordialloc	City of Ballarat-VicRoads Agency	Australia	Car mobility / Traffic	2017	N/A
Social Pinpoint	Parking Strategy	Lake Macquarie City Council	Australia	Car mobility / Traffic	2016	https://shapelakemac.mysocialpinpoint.com/parking?&_ga=2.230481180.1656670861.1529397345-214063770.1529397345
Stickyworld [Now: Confers]	Hexham Marketplace redesign	Hexham, UK	UK	Town market design	2016-2019	https://hexhammarketplace.stickyworld.com/home
Transform City	Amstel III	Amsterdam, Amstel III Development Plan	NL	Neighbourdhood development plan	2018	https://www.zocity.nl/

The use-cases concerned a range of urban planning projects. The main focus of the planning projects include: comprehensive planning and masterplaning (11 projects), metropolitan planning (3 projects), participatory budgeting (10 projects), active-mobility projects (6 projects), road & car mobility infrastructure (3 projects), regeneration and housing (3), built heritage and community assets (3 projects), engagement portals with multiple consultations (5 DPPs / 'projects'), parks and recreation (5 projects), urban visioning and development competitions (3 projects). Several projects addressed multiple aims. For instance, the masterplan for Dorothea Dix Park in Raleigh (NC) concerned parks & recreation and cultural heritage. There are also overlaps between regeneration projects, local plans and neighbourhood plans. Generally speaking, area-based plans often address multiple themes, with high-level projects addressing the broadest range of themes (e.g. comprehensive and metropolitan planning).

The gathered data several use-cases for the same DPP: *Bästa Platsen* (4), *Cap Collectif* (5), *Carticipe* (4), *CityPlanner* (5), *Commonplace* (7), *coUrbanize* (4), *Decidim* (2), *Maptionnaire* (6), *Social Pinpoint* (8). It features single use-cases for the other DPPs.

The distribution of use-cases is international. Figures 21-23 locates the projects on Google Maps. These are distributed across North America (13), Europe (44) and Australia (5). The geographical distribution of projects per country is: Australia (5), Canada (3), Finland (7), France (14), Germany (1), Iceland (1), The Netherlands (1), Sweden (9), the UK (11), and the USA (10). The colours of the place markers denote different DPP types: Red for 3D geoparticipation, Purple for 2D geoparticipation, Green for generalist/multifunctional platforms, and Blue for bespoke platforms.

Figure 21 - Location of use-cases in Australia (n=5 use-cases)

Figure 22 - Location of use-cases in Europe (n=44 use-cases)

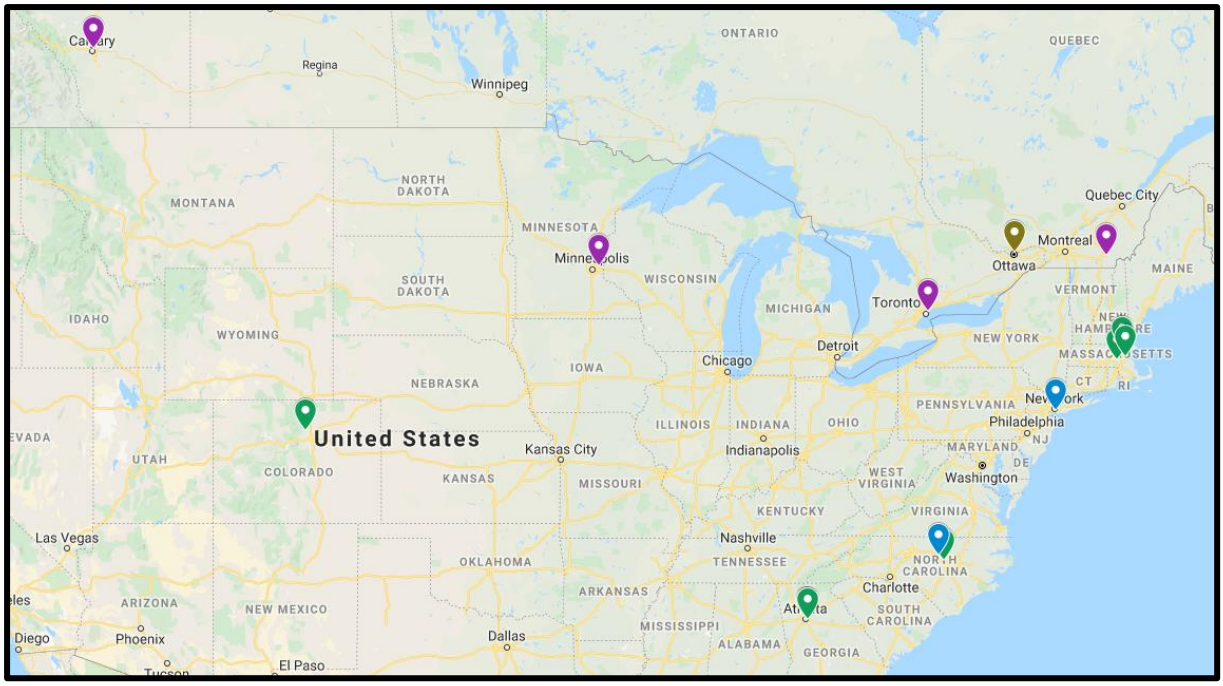


Figure 23 - Location of use-cases in North America (n=13 use-cases)

Although there is not enough space in the thesis to cater for a full description of each individual DPP use-case, below is selection of examples that help illustrate each platform category. A brief description of each use-case is provided. The description of use-cases here is not a presentation of the findings, which are all presented in the three upcoming Results chapters. The selection of use-cases meant to favour any use-case over any other, but simply to provide a taster of the diversity of DPP use-cases in urban planning.

5.3.1 3D geoparticipation

The use of *CityPlanner* by the city of Gothenburg and Nacka Municipality help to illustrate the use of 3D geoparticipation in urban planning.

5.3.1.1 CityPlanner (MinStad) at the city of Gothenburg (Sweden)

The city of Gothenburg was one of the earliest adopters of the 3D geoparticipation platform *CityPlanner* in 2012 (together with the city of Norrköping for which respondents were unavailable). *MinStad* is an advanced 3D, web-based geoparticipation application based on *CityPlanner* that enables both visualisation of the city as it is today, as well as 3D models of planned development projects. It serves both as a means of communication about development projects between planners and the public, and as an outlet for urban residents and visitors to share their views, experiences, and development suggestions for the city. The geographical extent of the 3D data covers a large part of the Gothenburg metropolitan region. Since 2016 *MinStad* is available as a mobile app as well. More recently, the upcoming celebration of the four-hundred year anniversary of the city in 2021 has been

advertised across different communications media. On the *MinStad* platform, this is introduced by means of a general dialogue and shared appreciation of the city. For example, the City library uploaded archival pictures of the built environment from the beginning of the twentieth century. *MinStad* viewers can also share personal stories about lived experiences or appreciations of places they value. The steady growth of the city of Gothenburg features significant urban development, including brownfield development. Below are screenshots from *MinStad.* Figure 24 shows an overview of *MinStad,* and Figure 25 shows individual functionalities.

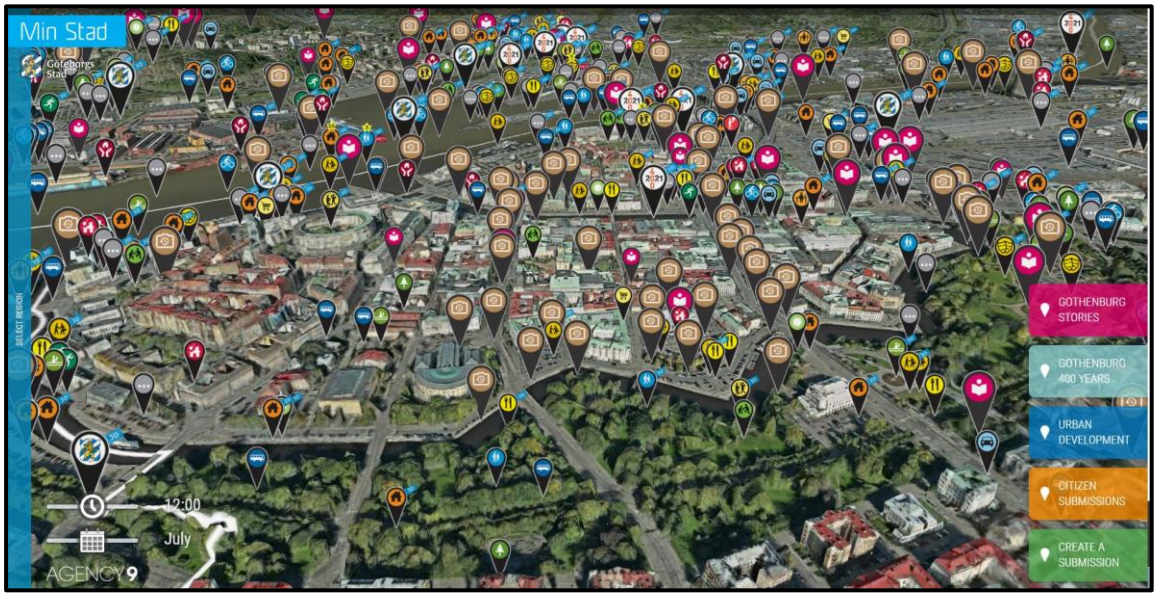


Figure 24 - Overview of MinStad (screenshot), Gothenburg

Figure 25- Individual functionalities on MinStad. Left: draw & insert a 3D volume. Right: write a story/comment

5.3.1.2 CityPlanner at Nacka Municipality (Stockholm region, Sweden)

As with most *CityPlanner* use-cases, the use of the DPP for 3D geoparticipation was concurrent to the use of the tool for internal project management at Nacka municipality, including 3D visualisation, communication, simulation and modelling. *CityPlanner* was first used in the winter of 2013-2014 to engage the public ahead of a comprehensive local plan for the Henriksdal district.[22] The plan was to feature new urban development as well infill development in the area. The aim of the preliminary consultation was to perform a sort of needs and perceptions analysis, including collecting residents' views about the places that were perceived as attractive, unsafe, or as requiring improvement or further development. The targeted publics were local residents and people who worked in the area. Similar to the initial launch of *CityPlanner* in Gothenburg, the first iteration of *CityPlanner* used in Nacka in 2013-2014 required the download of plug-ins, which could be time consuming and unsuitable for participants who relied on municipal computer equipment, for example in public libraries. The first consultation had the dual purpose of involving residents prior to formal planning and raise awareness about the upcoming planning process. The first iteration therefore served as a stepping stone for the second iteration of *CityPlanner*. The second iteration took place in 2016-2017 to consult residents about existing proposals as part of formal statutory consultation phase (*samråd*) about the comprehensive local plan. Below are screenshots of the second *CityPlanner* consultation at Nacka Municipality.

5.3.2 2D geoparticipation

5.3.2.1 Carticipe at Grenoble metropolitan agency (France)

The geoparticipation platform *Carticipe* was the main DPP used to support the engagement process for the first metropolitan plan of the recently created Grenoble metropolitan agency. The *Carticipe* platform was subcontracted via a local public engagement consultancy who was responsible for conducting and evaluating the bulk of public participation initiatives for the development of the metropolitan plan. *Carticipe* was used in two phases to support the production of the metropolitan plan for the Grenoble region. The final, permanently available map features three main tabs: i) the contributions submitted during the first phase; ii) a summary of the input from the first phase; and iii) the contributions submitted during the second phase. The first online mapping survey constituted a

[22] Information about the ongoing planning process in Henriksdal can be found here in Swedish. The content can be translated to English in Google Chrome. [https://www.nacka.se/stadsutveckling-trafik/har-planerar-och-bygger-vi/sok-projekt-pa-namn/henriksdal/#panel-startpage] [accessed 30 October 2019].

diagnostic phase to support the development of the comprehensive plan for the region (i.e. *PADD – Projet d'aménagement et de développement durable*) between March and July 2016. The second online mapping phase in 2017-2018 focused on articulating the broad orientations. End-user functionalities on *Carticipe* include real-time statistics about engagement activity on the DPP (number of participants, views, comments, votes etc), thematic icons for place markers, commenting, ideation, media uploads, liking/endorsing, sharing DPP content on social media, address search, thematic filtering of comments on the map and a basic user's manual. *Carticipe* is leveraged by the software provider Repérage Urbain, and does not provide any back-end design and data analysis tool to project managers at planning organisations. Figure 26 shows an overview of the *Carticipe* map-based survey, and Figure 27 show individual functionalities on the DPP.

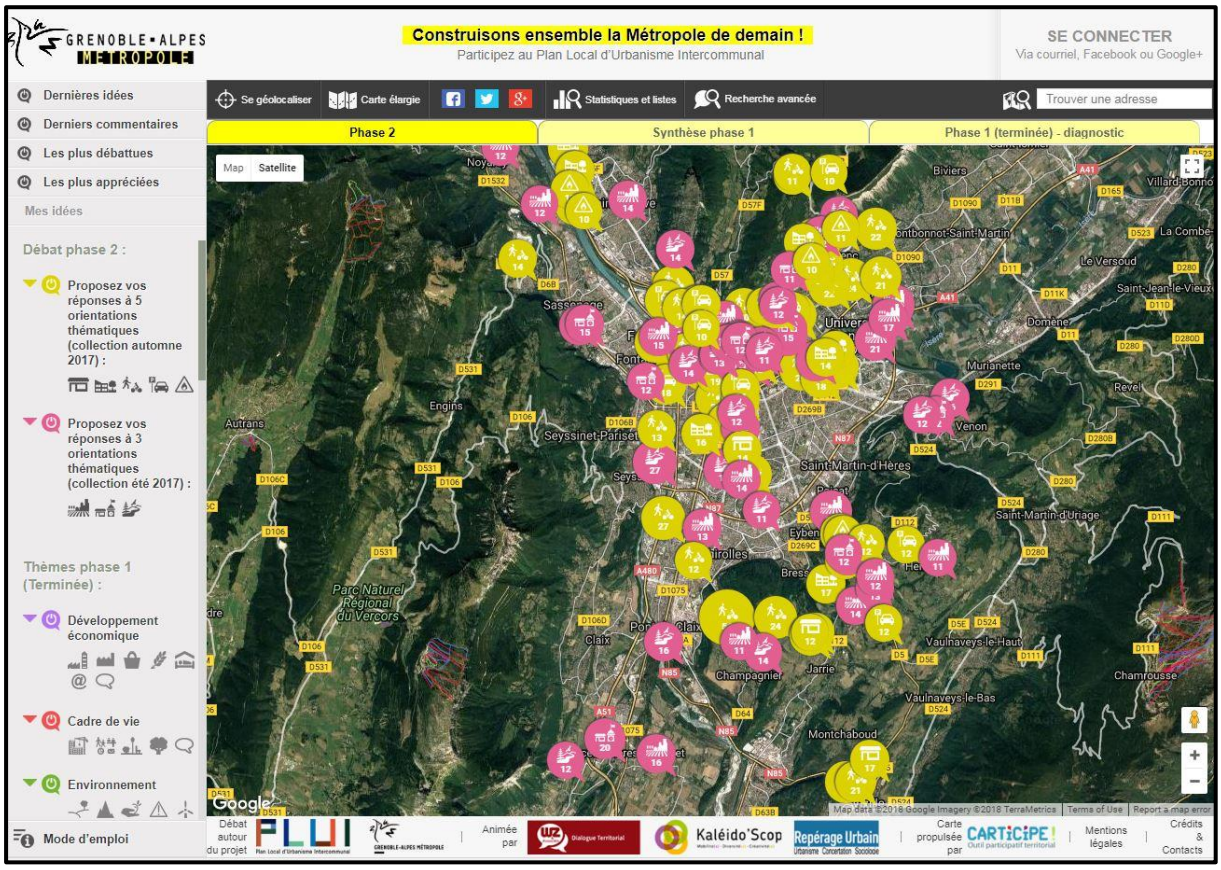


Figure 26 - Overview of Carticipe for the metropolitan plan at Grenoble metro (screenshot)

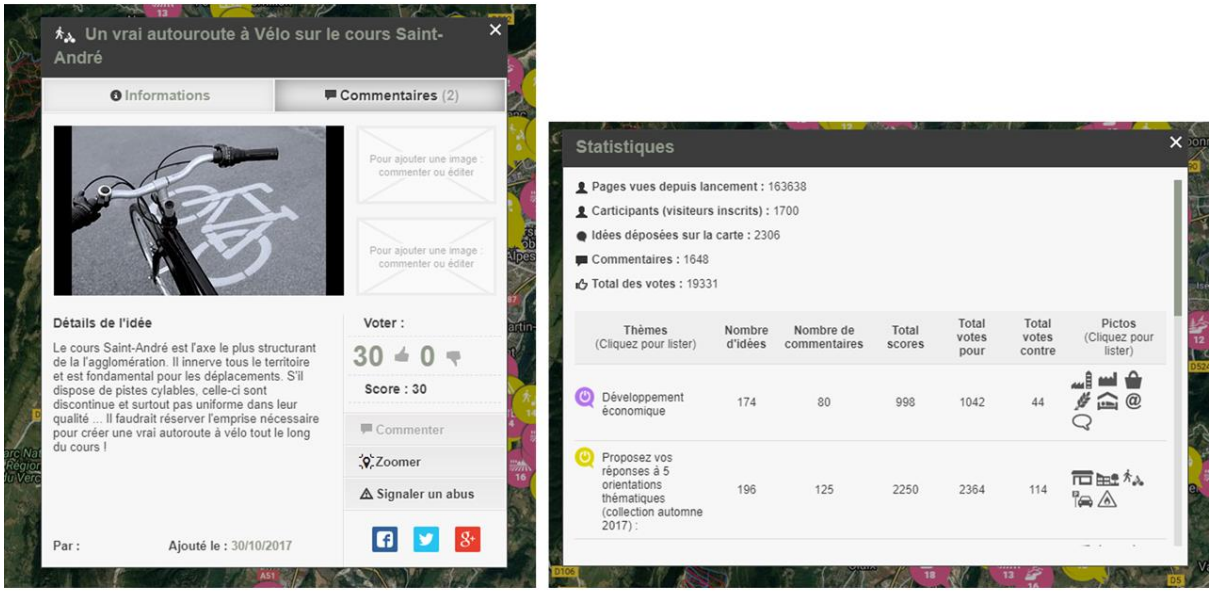


Figure 27 - Individual functionalities on Carticipe. Left: submit an idea. Right: real-time statistics about engagement activity on the platform, visible to all end-users.

5.3.2.2 Bästa Platsen, Skärholmen & Hagsättra districts at the city of Stockholm (Sweden)

The city of Stockholm used *Bästa Platsen* for multiple projects, including in the Skärholmen & Hagsättra districts to help guide a series of related regeneration and urban development projects in the respective districts (Fokus Skärholmen and Fokus Hagsättra-Rågsved). Both districts feature a diverse population, and faced similar issues in terms of engagement needs and planning orientations. The map-based surveys were conducted as needs/perceptions analyses at the beginning of the planning process to help inform all upcoming planning stages. The DPP is designed as a map-based survey with simple coloured markers that typically indicate either a positive or negative comment or idea, which respectively convey the overall feeling or '*Best places*' or '*Improve this place'. Bästa Platsen* surveys are typically deployed as needs/perceptions analyses. In order to compensate for participation gaps on the platform (e.g. in terms of age, ethnicity etc.), the web-based surveys can be complemented with boots-on-the-ground map-based interviews and oral interviews with bypassers and targeted stakeholder groups. Functionalities include a combined text-based and map-based survey, different base maps, and can also include post-engagement statistics about participation on the DPP. Survey participants provide basic information such as gender and age. Below is a snapshot of the use-case in Skärholmen (Figure 28).

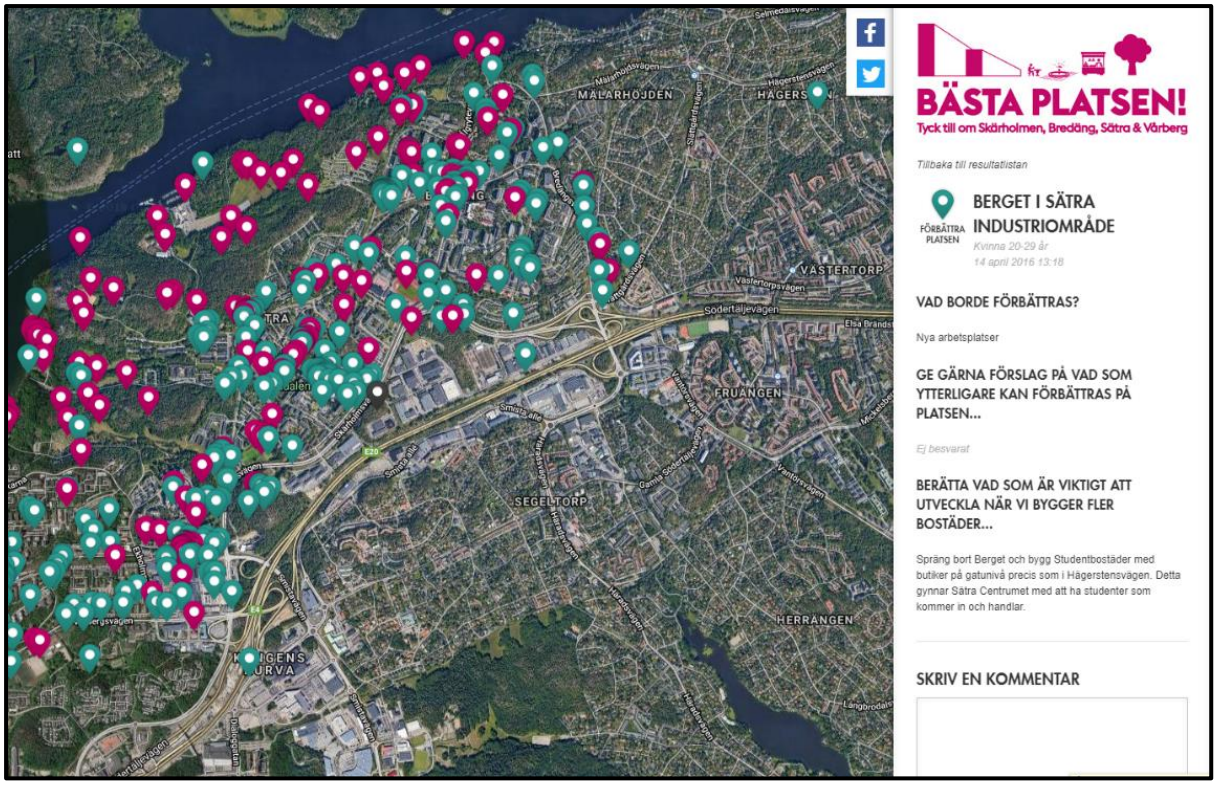


Figure 28 - Overview and details of one citizen contribution of the map-based survey Bästa Platsen in Skärholmen, city of Stockholm

5.3.3 Generalist/Multifunctional platforms

5.3.3.1 Neighborland at the city of Raleigh (North Carolina, USA)

Neighborland was adopted through single-source procurement as part of the public-private partnership with the park's Conservancy. *Neighborland* supported the development of the Masterplan for Dorothea Dix Park for an 18-month period. The project was considered the largest urban park development in the US at the time of the engagement process. The various engagement activities fed the development of the masterplan, with the final document compiling the results of the overall engagement process. Consultation for the final Masterplan document on *Neighborland* lasted two weeks in January 2019. The main themes arising from the consultation included relevant funding models for the park's development, parking availability at the park's location, and conservation of the park's heritage landmarks. The engagement process supported the work conducted by the consultancy procured for developing the Masterplan. Platform functionalities hinge mostly on ideation, commenting, information sharing, liking/endorsing other ideas and comments, and media uploads, and sharing of platform content on social media. Figure 29 shows a citizen-submitted idea on the DPP.

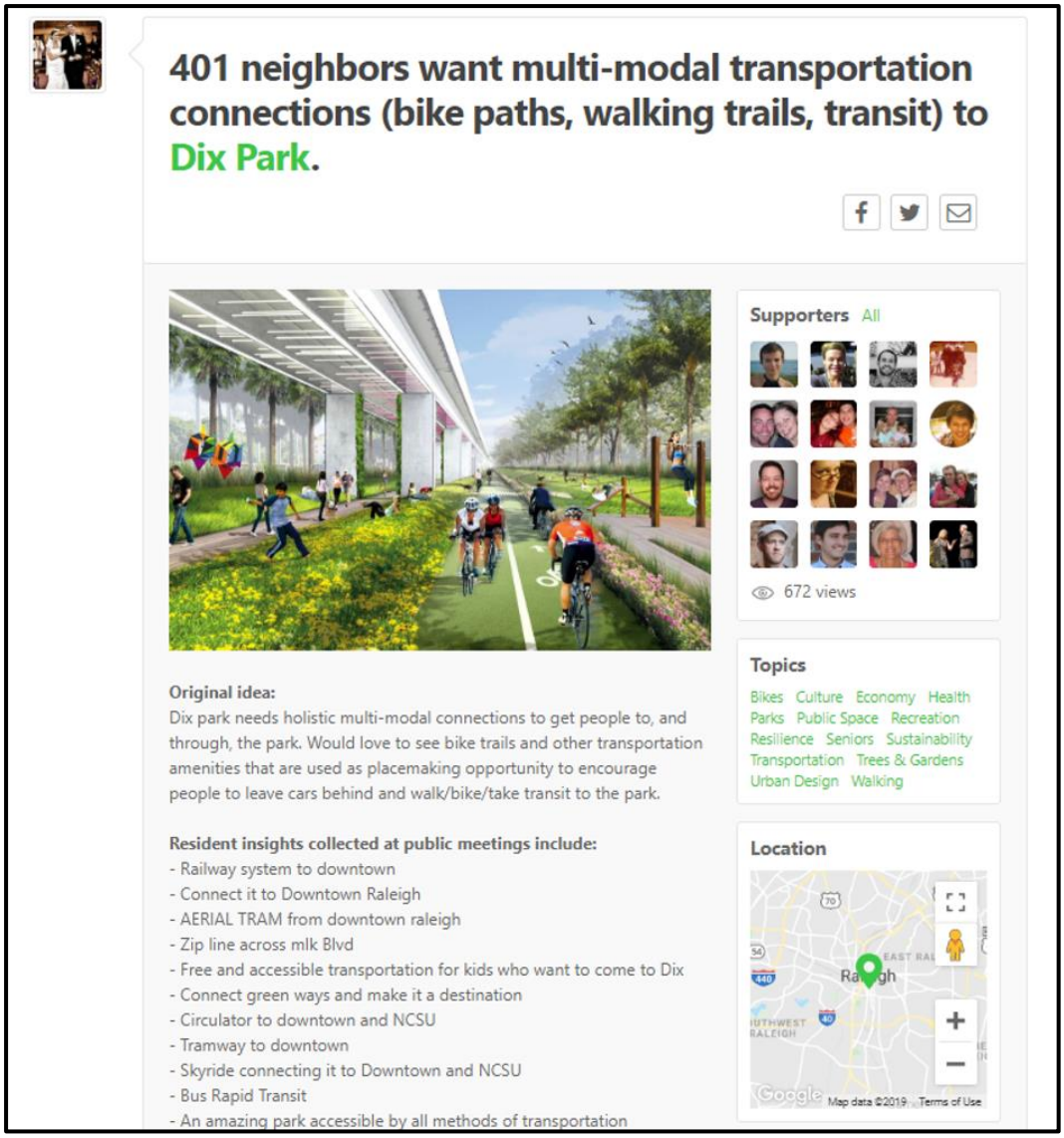


Figure 29 - Details of a citizen idea on Neighborland for the Dorothea Dix Park Masterplan, city of Raleigh (NC)

5.3.3.2 Decidim at Lille metro

Decidim was adopted as an experimental trial for the agency's engagement portal in 2018, following a similar one-year trial with *Cap Collectif* in 2017. The initial procurement process took place in 2016 at which time *Cap Collectif* was one of the few actors on the Civic Tech market in France, and largely outcompeted other candidates. When procurement process was renewed in 2018, *Decidim* appeared more suitable and more versatile to conduct engagement at a territorial scale of 90 combined municipalities, and because *Decidim* features a geoparticipation module which is missing from *Cap Collectif*. The engagement portal features consultations for a wider range of projects at the metropolitan scale or concerning specific areas for which the agency has technical competency. The platform enables a wide range of functionalities, not all of which have yet been used by Lille

metropolitan agency. Functionalities on *Decidim* include: ideation, commenting, ranking ideas, endorsing/liking, participatory budgeting functionalities, simple 2D geoparticipation, information sharing, and text-based surveys. Figure 30 shows an example of a citizen submission for a particular online consultation on the platform. The different tabs provide different types of functionalities for the consultation project, such information about in-person events, a text-based survey, background information, and so on.

Figure 30 - Overview of a consultation project on Decidim at Lille metro, showing the different tabs with associated functionalities

5.3.4 Bespoke platforms

5.3.4.1 Participatory budgeting portal ('in-house') at the city of Grenoble (France)

Following a one-year experimentation with the now-obsolete platform *Nous Rassemble*, the Grenoble participatory budgeting platform was developed in-house in collaboration with an external IT provider, with the exception of the voting functionality which is provided by a specialised third party service to ensure reliable security. Grenoble is one of the pioneer cities in France for participatory budgeting, having launched its first cycle in 2015. The in-house development ensured that the city staff could customise and control the use of the platform fully according to its needs and engagement orientations, as opposed to proprietary software licenses which necessarily entail greater dependence on the software providers for product upgrades and technical support, not to mention licence cost. The

city's website also hosts an interactive map of all on-going projects[23], classified according to five project categories: i) participatory budgeting; ii) information; iii) consultation (*concertation*); iv) co-production (*co-construction*); and v) participatory project delivery/implementation. The platform enables participants to view and submit project ideas as well as to vote. As with most participatory budgeting platforms, extensive information is also provide about project updates, such as implementation status. Figure 31 shows a citizen-submitted project idea that has received the fourth most votes.

Figure 31 - Details of an elected citizen project for the participatory budgeting on the city of Grenoble' own e-Participatory Budgeting portal

[23] Interactive map of on-going engagement projects at the city of Grenoble available at: https://www.grenoble.fr/1223-carte-des-demarches-participatives.htm [accessed 5 September 2019].

5.4 Summary of the Introduction to the Results chapters

This introduction to the three Results chapters began by clarifying some of the main terms used in the thesis, including interchangeable reference to the notion of 'public participation', such as community engagement, citizen participation, and the like. It also proposed a fourfold categorisation of the range of DPPs investigated in the thesis, as based on the definition provided by Falco and Kleinhans (2018b). On that basis, the chapter also provided an overview and description of the main platform types, including typical functionalities. In total, 25 platforms are investigated that relate to 61 use-cases distributed across North America, Europe and Australia. Examples and short descriptions of typical use-cases are also provided with the sole purpose of illustrating the diversity of DPP use-cases in urban planning. The thesis now turns to the presentation of the survey and interview responses from 83 planning professionals, followed by the interview responses from 13 software providers.

6 Results: Public Participation

6.1 Introduction

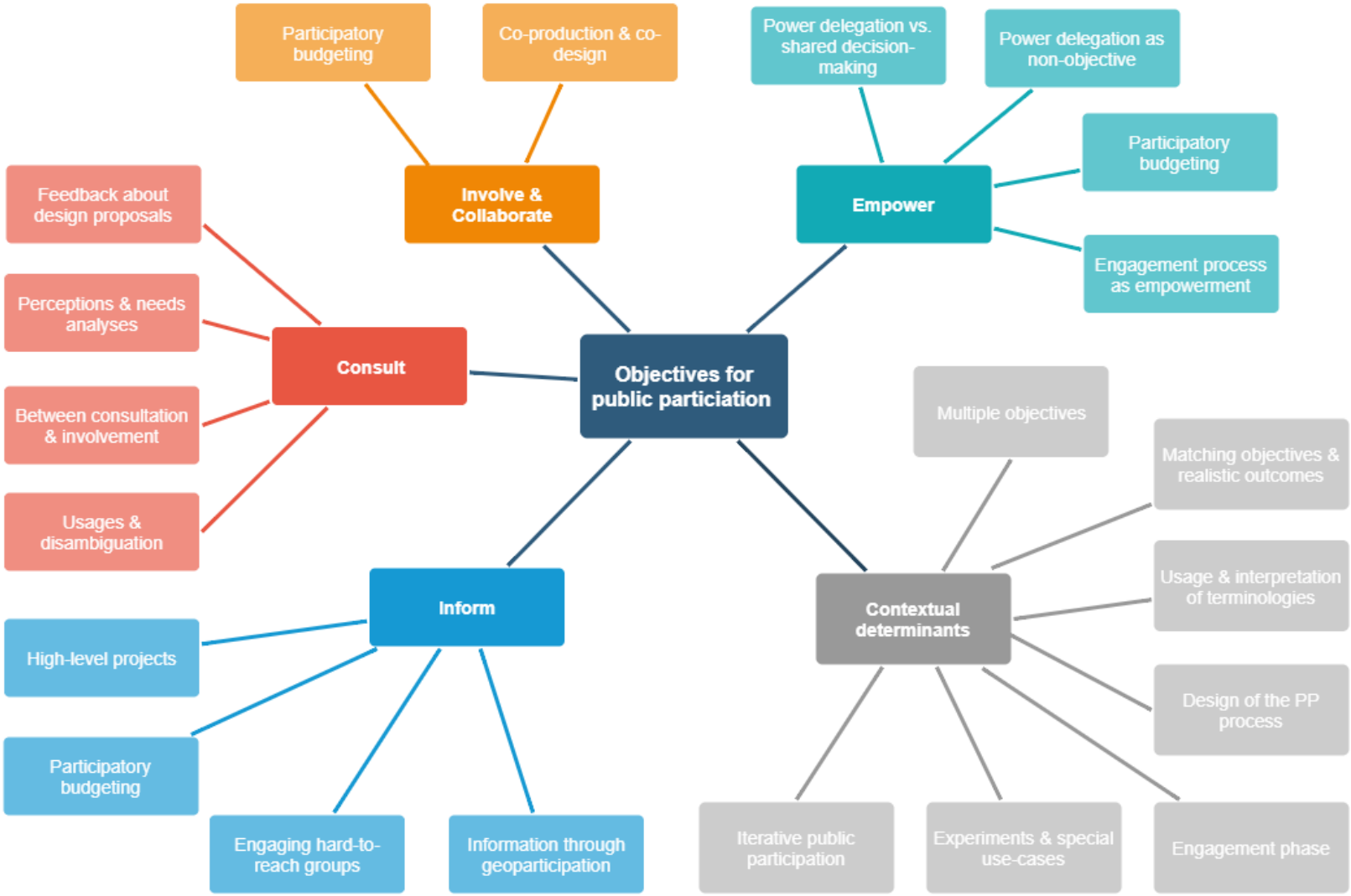
This chapter presents the views of planning professionals regarding the design and conduct of public participation. In particular, it focuses on the objectives for public participation, the technological features of DPPs and supporting ecosystems of tools for public participation. As such, it complements the Results chapter that presents planning professionals' views about planning processes and workflows and the related underpinning organisational and institutional factors. It also complements the Results chapter that presents software providers' responses about the objective for public participation.

6.2 Objectives for public participation

This section presents the results regarding the objectives for public participation mentioned by planning professionals. Figure 32 provides a thematic overview of the responses. This section begins by outlining the responses as per the IAP2 Spectrum engagement objectives.

When asked about engagement objectives, planning professionals also mentioned a range of factors that do not neatly fit in the IAP2 categories. These descriptive factors are presented as contextual determinants. Importantly, the interview responses typically referred to engagement objectives and influence on planning simultaneously, and using the same terminology. It was therefore impossible to disentangle the comments about engagement objectives for using DPPs on the one hand, from DPPs' perceived influence on planning on the other. A full consideration of the engagement objectives therefore needs to be complemented with the findings about DPPs' perceived influence on planning in the Results chapter "Planning decisions, processes & workflows."

Figure 32 - Thematic overview of the emerging categories concerning the objectives for public participation (responses from planning professionals)



6.2.1 Inform

Informing the public about both the urban planning projects and the possibility to participate was a precondition or preliminary step for other levels of public participation. Twenty-six planning professionals explicitly stressed the need to inform in one form or another.

Planning professionals noted that Informing was a key objective for high-level and complex planning projects. Particularly, comprehensive plans, metropolitan plans and master plans required significant levels of information and corresponding budgets for communication and marketing (e.g. Grenoble metro; Lille metro; Atlanta region; Nacka; Raleigh). Various forms of street-level communication and targeted in-person outreach for specific demographic groups helped to communicate broadly about the nature of these planning projects. Planning professionals stressed that such high-level, strategic projects were difficult to grasp for citizens mostly because these deal with long-term and large-scale planning orientations that largely exceed citizens' day to day concerns.

Planning professionals at the city of Raleigh all reported the significant efforts spent in explaining what a master plan was to the public through all possible means, including through the *Neighborland* platform. For instance, a respondent stated that it was difficult to raise awareness about the broad-level engagement purposes for the master plan, as these did not necessarily coincide with residents' day-to-day interests and expectations about the engagement process:

> The master plan almost provided too much detail in the way that people commented on lots of small details, and that we needed to pull people out of the weeds, and remind them: this is a high-level plan [*Raleigh-CE-officer*].

High level projects that featured geoparticipation lent themselves to citizen contributions that dealt with low-level issues such as improving street cleanliness or repair needs for street fixtures. The latter indicated a need to clarify and better inform the public about the strategic nature of the planning projects (e.g. Grenoble metro; Lille metro; Gothenburg). A community engagement officer at Lille metropolitan agency expressed that a significant number of contributions on the DPP were not salient for the metropolitan plan.

Nonetheless, even citizen contributions that did not align with the purpose of public participation on the platforms were deemed useful because informing the municipalities about improvement needs in the built environment. Citizen comments were then typically forwarded to the relevant technical or sectoral departments within the city agency. For example, in Gothenburg, citizens' reporting of transport and mobility infrastructure were systematically forwarded to the transport/highways department. Interestingly, while the platforms and other means of public participation were meant to inform the public about high-level urban planning processes and issues, citizens often used these

platforms to inform the municipality about problems that immediately affected their day-to-day life. In Leeds, for instance, residents' comments on topics such as fly tipping, which had little to with the purpose of the engagement.

A respondent working on the Lille metropolitan plan expressed that engagement objectives were largely informational, due to the nature of the complex planning process, which affected the public participation approach as a whole:

> With this type of project, if we take the IAP2 Spectrum, we do not really do involvement [*concertation*], but we straddle instead between information and consultation. One of the goals of this type of project is to be able to explain to residents, in a pedagogical way: What is a metropolitan plan? What does it entail? What difference does it make? And what are its milestones? So substantial resources are often spent in communication, to pedagogically explain what the project actually is about. And as citizen or resident, it is always more difficult to comment and give one's views about high-level, somewhat abstract orientations as opposed to providing views about the street or neighbourhood where one lives. This difficulty is inherent to this type project; whether it is through digital means or not, it doesn't change much, I think [*Lille-CE-Consultant*].

All participatory budgeting featured extensive communication about the complex procedure and multiple stages of the participatory budgeting process, from project ideation to voting and updates about the actual implementation of selected projects. A variety of online, street-level and paper-based communication channels were used depending on context. City agencies which were first time adopters of participatory budgeting typically required significant investment in communication and marketing to inform the public about the modalities of participation at different stages of the process. Over the years, planning professionals indicated that the public better understood the various requirements, assessment criteria and milestones of the participatory budgeting procedure, which reduced resources required for communication, and also improved the quality of citizen project ideas submitted on the DPPs (e.g. Montreuil, Rennes, Reykjavik).

Several city agencies faced challenges in engaging hard-to-reach groups[24]. Hard-to-reach demographic groups most mentioned by city agencies were older residents, ethnic minorities, youth, children, young adults (including students), and residents in deprived neighbourhoods. Planning professionals expressed the need to target hard-to-reach groups in specific districts or neighbourhoods through various street-level and other face-to-face outreach (Raleigh; Atlanta region; Boulder). In some cities and urban districts, hard-to-reach groups and/or deprived communities comprised a significant proportion of the local population, which required adequate resources to inform about the planning projects and engagement opportunities (e.g. Bagneux; Hagsätra; Skärholmen; city of

[24] Specific methods for outreach are discussed under Ecosytem of tools for public participation in this chapter.

Grenoble; Grenoble metro; NYC; Boulder). For example, in Spitalfieds, the Neighborhood Planning Forum conducted a mix of street-level outreach and door-knocking to raise awareness among the Bengali community, including local businesses. DPPs were almost unanimously valued as enabling to reach out more broadly in terms of numbers of participants and diversity of views being expressed. Nonetheless, communities that were traditionally not participating through traditional methods of public participation were targeted specifically by city agencies to inform them about available opportunities for public participation, including the DPPs.

The type of information provided differed between geoparticipation and non-geoparticipation platforms. The geospatial component of geoparticipation was their strength. Platforms that primarily facilitated geoparticipation at best provided succinct background information about the planning project to the public (e.g. Grenoble metro; Lille metro). Likewise, the *Social Pinpoint* applications generally featured low-level introductory information about the planning projects. *Bästa Platsen* was the geoparticipation platform that provided the least information about the planning projects. *coUrbanize* and *Commonplace* being generalist platforms with a strong geoparticipation component (depending on use cases), these typically featured more significant background information, such as timelines, updates and/or the opportunity to sign up for email updates via a newsletter. For use-cases that featured geoparticipation platforms, a range of online, in-person and paper-based communication channels were often deployed depending on context.

Being spatial by nature, geoparticipation platforms were more apt at communicating the spatial and geographical dimensions of planning projects than other DPPs. This unique feature of geoparticipation platforms was often viewed as facilitating clearer engagement and providing a stronger basis for other engagement objectives.

The geoparticipation component in some projects (e.g. *Carticipe*, *MinStad*, *Commonplace*) sometimes facilitated citizen reporting of street-level maintenance issues experienced at specific locations, even though dedicated channels were usually available to citizens for reporting such low-level issues. This citizen reporting of street-level maintenance issues was perceived by some planning professionals as one-way information provision from citizens to the local councils, rather than as consultation as such (e.g. Gothenburg, Lille metro, Grenoble metro, Leeds).

6.2.2 Consult

Consultation, together with involvement, was one of the two objectives most mentioned by the planning professionals. A common denominator across all planning professionals who referred to the term “consult” was the aim to seek out the views, opinions, preferences and/or local knowledge of residents. he responses revealed a diversity of uses and interpretations of the “consult” category. Notwithstanding the IAP2 definition of the category, planning professionals’ subjective

interpretations of the term related to their awareness of different public participation models and experience as community engagement practitioners[25].

Uses of the term "consultation" in the French use-cases sometimes required disambiguation, most notably from the French term *concertation*.[26] For example, the engagement portal at the city of Toulouse supported a wide range of engagement projects. As such it was perceived to facilitate public participation at large (i.e. *concertation*) rather than any specific objective. At the same time, a respondent at the city of Toulouse expressed that 'consultation', in the IAP2 sense of the term, was the prevalent use of the platform across the different online engagement projects:

> We we sit more within 'consultation'. *Concertation* [note: untranslated] will be the overall public participation approach... *Concertation* will entail several stages. It could be for diagnostic purposes, it could be an informational public meeting, it could be a *concertation* public meeting where we will discuss, perhaps also consult. [...] We always use the term concertation when it comes to public meetings. Online, however, when it is more specific, we consult. So when we ask on the platform: give your views or preferences, it is not voting. [...] It will only be a tool to assess a choice or several options, or to vote on a range of options, with people who would not normally come to public meetings. But if we add up all the avenues of participation, all the public meetings and all the tools, we will not only use the platform as analytical tool. So on the platform we lean towards consultation, with a wider *concertation* perspective [*Toulouse-CE-officer*].

Most of the responses for the DPP use cases in England (e.g. all *Commonplace* cases; Hexham) referred to consultation as denoting the public participation/engagement process at large. Such use of the term 'consultation' as an overall *process* rather than a specific engagement objective in the sense denoted in the IAP2 Spectrum was perhaps similar to the French term *concertation*, although not identical. When considering specific components of the overall consultation process, consultation could also denote a particular engagement objective or activity. A respondent in Newcastle distinguished between 'consulting' as a specific objective or task, and 'consultation' as an engagement process.

> [*Interviewer*]: What was your general goal engaging the public?
>
> [*NewcastleUK-CE-senior1*]: It depends very much which piece of consultation, I mean we would never use it just for information. So, it is always about getting feedback from people.

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[25] These broader interpretations of different public participation models and categories are addressed in more detail in Section 6.2.5 ('Contextual determinants').

[26] The French use of the term *concertation* is somewhat fuzzy. Below are three different dictionary definitions:
1) The French Larousse defines *concertation* as: "Act which consists of preceding a decision with a consultation of interested parties" [own translation].
2) The bilingual Larousse defines *concertation* as either: "1. Dialogue;" or "2. Consultation".
3) In contrast, Lexico.com (formerly Oxford University dictionaries) defines the English term *concertation* as: "working or acting in concert, cooperation". It also defines the term *consultation* as: "The action or process of formally consulting or discussing."

> [The platform] *Commonplace*, although it does impart information to users, it gives them information, informs them and helps them to decide how to respond, it is not just a one-way channel. So, it is always higher up the Arnstein's Ladder of Participation, I would say.
>
> Sometimes it is purely about gathering information from the user, when we use the Needs Analysis tool. And sometimes it is about consulting when we are asking them to give us feedback on a proposal or a design. So, *Commonplace* offers both features, so we use the Needs Analysis Heat Map for people to pinpoint a location and then tell us something about what is good or bad about that location and how we can improve it. And in the survey mode when we were asking for feedback, we show people a proposal that we have put together to overcome their issues and ask them to tell us what is good and bad about that proposal.

Interestingly, the respondent makes a distinction between gathering information from users as one-way information provision, and consulting to gather feedback from participants.

An important component of consultation on the IAP2 Spectrum consists of providing feedback to the public. Whether the DPP both enabled to collect citizens' views and provided feedback varied across the DPP use cases. At Nacka municipality, the respondent expressed that the DPP did not fully fulfil the consultation component because it did not allow to provide feedback to the public. Instead, feedback was provided through various planning documents and engagement summaries on the municipality's website. In other instances, such as the *Commonplace* use-case in Newcastle presented above, feedback to the public was also provided on the platform itself. Most generalist/multifunctional platforms provide such feedback, either by providing detailed engagement updates and summaries directly on the platform (e.g. use-cases for *coUrbanize*; *Bang the Table*; *Neighborland*, *Cap Collectif*, *Decidim*), or by way of concise updates supplemented by hyperlinks to more detailed documents hosted on the city's website (*Commonplace* use cases).

Consultation was often mentioned for non-specific purposes, such as general needs analyses, perception analyses, and preliminary collection of citizen views and preferences to inform future planning. Typically, geoparticipation helped to perform needs analyses and perceptions analyses in early planning stages for a range of planning projects (e.g. all *Maptionnaire* projects; all *Bästa Platsen* projects; Newcastle, Waltham Forest & Spitalfields: *Commonplace*).

Feedback about specific design proposals that took place later on in the urban planning process was often perceived as consultation. For example, this was the case for projects with street design proposals that encouraged active mobility, such as walking and cycling (e.g. Newcastle; Waltham Forest; Hamburg). In Newcastle and Waltham Forest, citizens were consulted on final design proposals elaborated in an iterative manner in the preceding engagement phases. At such later stages, consultation about specific proposals was sometimes referred to as 'formal consultation'.

At Nacka municipality, 3D models of the design proposals that were uploaded on *CityPlanner* were indicative rather than definitive in terms of aesthetics or even exact location. Citizens still had the

opportunity to influence the content of the plan. Nonetheless, this consultation stage was also characterised as formal consultation (i.e. *samråd*), as part of the implementation of the comprehensive plan for the district.

6.2.3 Involve & Collaborate

The distinction between involvement and collaboration was sometimes difficult to delineate, particularly in the semi-structured interviews, but also in the survey responses that mentioned both involvement and collaboration as engagement objectives. Furthermore, they were often mentioned together by planning professionals. Because of the fuzzy boundary between the two objective categories in the responses, they are presented together.

In participatory budgeting use-cases, the distinction between involvement and collaboration hinged on whether project holders were active in the implementation of the projects (i.e. as collaborating with the technical staff at the city agency), or whether they were simply involved in ideation during the project submission phase and campaigning for their project during the voting phase.

At the city of Paris, the participatory budgeting featured varying degrees of involvement, collaboration and even empowerment by virtue of its reliance on active citizens for project ideation, implementation and/or project feasibility evaluations. Occasionally, project holders took part in the actual implementation of their projects, which a respondent viewed as a form of 'delegation' of implementation rather than power per se:

> In some projects, there was this idea of involving, collaborating or even delegating for specific projects. Delegation might take place for participatory construction sites, for example projects connected to the Paris green belt. There were several participatory construction sites carried out by community groups at various locations together with local residents. Community groups were paid by the city of Paris to build urban fixtures or implement urban interventions, typically temporary interventions, together with residents. It was their responsibility to recruit participants and lead the participatory construction sites [*Paris-PB-officer*].[27]

The city of Paris was keen to advertise projects where delegation had taken place at the implementation phase, as these could serve as exemplar projects to inspire more Parisians to participate. Overall, however, involvement seemed more common than collaboration or delegated implementation. In most instances, project holders worked to develop their project proposals and campaigned to garner support, but typically the city's technical services were responsible for the actual design and implementation of the projects. Other projects were ambitious in their objective to

[27] The respondent referred to the following case as an exemplar participatory construction site in southern Paris (René-Coty / Denfert-Rochereau):
https://budgetparticipatif.paris.fr/bp/jsp/site/Portal.jsp?document_id=3764&portlet_id=158

foster collaboration and delegation but encountered practical and procedural difficulties at the feasibility assessment stage. For example, an ambitious project that aimed to provide shelter for the homeless fell short of its engagement objectives, due to various technical obstacles, and project implementation and delivery have been delayed somewhat.[28]

Levels of collaboration and involvement may also vary over the course of project holders' participation. Across all the participatory budgeting use-cases, regardless of location and platform, it was common for some project holders to become less involved over time, particularly after the voting phase. This phenomenon was sometimes described as a form of engagement attrition of some project holders from the participatory budgeting process. As similar projects are typically merged, personality and group work dynamics meant that some project holders would lead or dominate others. Engagement attrition could take place in such instances, as less active or motivated project holders would then take a back seat during project refinement, campaigning and/or implementation. In Bagneux, project holders sometimes abandoned their project altogether, which left council staff to manage it entirely.

The form of participation in participatory budgeting also varies across countries. In the US, citizens can volunteer as budget delegates and become responsible for a substantial amount of the work of feasibility studies for the incoming project ideas. In New York City, all budget delegates were volunteers, while in Durham (NC) 25% of budget delegates received financial compensation for their work. Amongst other tasks, the work of budget delegates consists in contacting project holders for clarifications, helping them refine and raise interest about their project ideas, and conducting site visits to assess project feasibility. In France, participatory budgeting committees or juries consist of a selection of citizens from neighbourhood assemblies who help technical staff and participatory budgeting officers with feasibility studies. The incumbent work of such committees and juries, although substantial, is seemingly less demanding than that required of budget delegates in the US context. As such, the level of collaboration (and potential overload) could perhaps be higher among US budget delegates than among members of the budget juries. At the city of Helsinki, volunteers were mostly involved in helping to facilitate in-person public meetings and various workshop with project ideation, refinement and merging of several project proposals into "plans". Unlike in France and in the US, the responsibility for feasibility studies lay exclusively on expert staff at the city of Helsinki. The design of the participatory budgeting process in Helsinki does not have scope for

[28] The project of providing shelter to homeless people was the convergence of several project ideas and was voted by over 20,000 Parisians on the platform. It secured a budget of 5 million euros. Updates about the project can be found here on the city's participatory budgeting platform: https://budgetparticipatif.paris.fr/bp/jsp/site/Portal.jsp?document_id=2719&portlet_id=158.

delegation of project delivery to project holders as it does in Paris. Instead, expert staff will be responsible for project design and implementation.[29] In Reykjavik, feasibility studies were also conducted by expert staff at the city agency. The participatory budgeting officer was responsible for helping project holders to refine their project ideas.

More generally, participatory budgeting officers and budget delegates often collaborated with various community groups for awareness raising, and also to support citizen involvement in terms of project ideation and voting. For instance, participatory budgeting officers often collaborated with community centres and neighbourhood associations (e.g. Montreuil, Grenoble, Rennes, NYC, Paris), district-based citizen assemblies (e.g. Grenoble), and schools and adult learning centres (e.g. NYC, Durham (NC), Reykjavik). These forms of collaboration sometimes enabled broader outreach and engagement in observance of municipal social inclusion strategies, including in deprived areas, which were not exclusively limited to the participatory budgeting process (e.g. city of Grenoble). At the city of Paris, some neighbourhood associations received financial compensation for running in-person polling stations.

Co-production & co-design use-cases consistently featured high levels of involvement and collaboration. Co-production processes characterised the public participation as a whole, of which the DPP was a core part and enabler. At the Toulouse metropolitan agency, specifications for the development proposal competitions rested on a number of criteria, including collaboration between design and development firms on the one hand, and various stakeholders from civic society on the other. Other important criteria included inclusiveness, heritage considerations, design innovation, ecology and other socio-economic, environmental and cultural dimensions of the proposals. Both processes and outcomes were meant to be collaborative, on the basis of sound business models in terms of capital investment and project running costs, and plans for a lasting collaboration between private, public and civic actors beyond the duration of the bidding and project construction phases. Due to the short time-frame of the bidding process, however, political collaboration across the region was not optimised, leading to some locations of the metropolitan region being underrepresented in the bidding process.

However, peaks of intensity in terms of collaboration and involvement often did not take place on the DPPs, but rather through in-person and face-to-face workshops, events and dialogue. In Newcastle and Waltham Forest, the use of *Commonplace* was used both before and after co-design workshops

[29] The first iteration of the participatory budgeting at Helsinki was ongoing at the time of the interview. The voting phase was scheduled for the autumn of 2019, followed by project implementation in the various districts of the city.

that helped to elicit specific design proposals from workshop participants. In both local councils, the first engagement survey on *Commonplace* consisted of a map-based survey which informed the workshops. The second iteration of *Commonplace* hosted design proposals for public consultation that had emerged from the co-design workshops and had then been fine-tuned by local council staff. While the initial map-based survey on *Commonplace* facilitated a mix of consultation and involvement, the mainstay of collaboration seemed to take place in the in-person engagement. In the Mini-Holland programme at Waltham Forest, significant collaboration also took place during project implementation as some residents participated in the actual construction of parts of the street redesigns, for example in introducing pocket parks and street embellishments. A number of cycling activists and other civically active residents also collaborated extensively with the city council at various stages: i) in preparing the cycling infrastructure proposal for the funding bid from Transport for London; ii) in raising awareness among the public through street-level outreach and information drop-ins; iii) in participating in the co-design workshops; and/or iv) in initiating or joining participatory construction sites during the project implementation phase.

In Newcastle, the community engagement team relied on the collaboration of community groups to help inform about and leverage the co-production workshops, due to austerity-related cuts in budgets for public participation:

> There isn't enough of us (Consultation & Engagement staff in Transport) to do this very in-depth engagement work. So, we rely on collaborations all the time. We rely on people in the community and the reference groups if it is Streets for People [the engagement programme for the street redesigns] to help us connect with the community, and similarly, if we are engaging during the implementation of, but if it is about implementing schemes, we rely on local organizations and community networks, the local councillors and active citizens. We have to plug into community infrastructure that is already there rather than trying to create from scratch [*NewcastleUK-CE-senior1*].

Several planning professionals for participatory budgeting use-cases also articulated involvement and collaboration in terms of co-production (e.g. *co-construction* in French use-cases) (e.g. Montreuil: *Cap Collectif*). In the city of Raleigh, a respondent viewed that *Neighborland* had not been so successful at involving participants during the master plan development phase. However, the platform was expected to support collaboration at the implementation stage.

6.2.4 Empower

Eighteen planning professionals made explicit mention of the desirability and/or inherent problematics of seeking to empower citizens through DPPs. Responses that mentioned some form of empowerment pertained primarily to co-production and participatory budgeting cases. Given the structure of representative local democracy, empowerment was also mentioned as a non-objective. Finally, empowerment was also addressed both in terms of outcomes and processes by planning professionals.

An important distinction between *power delegation* and *shared decision-making* emerged from the responses. In France, particularly, planning professionals repeatedly made a distinction between empowerment as citizen control (*délégation*) and shared decision-making (*co-décision*). This distinction took stock of the basic structure of representative local democracy. The difference between the two aspects of empowerment was seen as primordial. While the former enables citizens to steer decisions, the latter emphasises that citizen input is only one element used in decision-making. Shared decision-making was more familiar to planning professionals than power delegation (e.g. city of Toulouse; Rennes). At the city of Toulouse, an adaptation of Arnstein's Ladder of Participation substitutes shared decision-making (*co-décision*) for power delegation.[30]

Small-scale planning projects that engaged smaller groups of participants could be more conducive to power delegation. An urban planner at Jyväskylä municipality mentioned that engagement with a group of youths enabled them to obtain new space for social activities in the city centre. Likewise, responses for participatory budgeting use-cases indicated that individual projects are typically smaller in scale and lend themselves to power delegation, as compared to use-cases concerning high-level planning documents or large urban development projects. In Hexham, the co-production of development alternatives, followed by citizen selection of the final proposals, was articulated as power delegation (i.e. letting the citizens decide).

Related to the above, empowerment as power delegation was often deemed as something that could not be envisioned. Interestingly, ten planning professionals explicitly referred to power delegation as a *non-objective*, i.e. as something that was simply out of bounds within the planning context (e.g. Skärholmen). When this was the case, city staff made efforts to communicate to the public that delegated decision-making was not on the agenda, and sought to clearly articulate the actual objectives of the public participation and the prevailing decision-making procedures that were in place. Similarly, a respondent in Newcastle highlighted the impossibility of power delegation given the decision-making procedures in place:

> We will only say to people, we are consulting them if they genuinely can influence the outcome. We will never say to people that it is your decision, because it is never their decision, but their views do influence the decision maker/s. The city council is the highway authority and the planning authority and the decision-making process will be different in each case, but undoubtedly there will be layers and layers of decision-making, including project-boards, councillors, senior officers and cabinet members, it depends on how much the intervention costs and how high the stakes are [*NewcastleUK-CE-senior1*].

[30] Municipalities' interpretations and context-specific uses of public participation models are presented in a sub-section below in the chapter.

Co-production projects lent themselves to shared decision-making rather than power delegation as such, particularly as articulated in terms of process rather than power delegation, as detailed in the next section. Participatory budgeting projects also featured a significant degree of co-production. Many of these projects were small in size, where voting and/or project ideation and implementation could be associated with some levels of empowerment, as presented below.

Participatory budgeting cases stand out because of their greater potential to facilitate empowerment, in contrast to DPP applications for other types of urban planning projects. Due to the voting/polling phase that enables the public to select citizen-driven projects, several planning professionals viewed that participatory budgeting aimed to empower citizens to help allocate council capital investment. Far from being an absolute and fully-discrete level of participation, planning professionals also acknowledged that the proportion of total council expenditure allocated to the participatory budgeting needed to be considered in assessing the actual level of empowerment (e.g. NYC; Rennes; Grenoble; Montreuil; Reykjavik).[31] In contrast to the other cities investigated here, the total budget allocated to the participatory budgeting in New York City is not city wide but dependent on the number of districts joining the scheme. At present, not all districts participate, but the number of active districts has been growing consistently since the city's first adoption of the process. Several cities are considering expanding the budget allocated to participatory budgeting, particularly in the French cases reviewed here, which fact was also widely discussed at the French participatory budgeting conference in November 2018.

Planning professionals for participatory budgeting use-cases understood empowerment either as power delegation or shared decision-making. These different dimensions of empowerment could relate to different components and stages of the participatory budgeting process, as per context. Illustrating such differences, a community engagement officer for the Paris participatory budgeting expressed differences between the voting phase and the project implementation phase, as these may facilitate different forms of engagement which may not necessarily feature empowerment. The respondent shared that the Paris city council always observed citizens' votes.

In other cases, planning professionals viewed power delegation as associated with voting, and collaboration as conducted with project holders in developing and sometimes also co-delivering their

[31] The issue of assessing both the effectiveness of participatory budgeting in terms of the percentage of total municipal expenditure was discussed at length at the 2018 French national participatory budgeting conference at the city of Montreuil. The percentage of expenditure constitutes one of the major benchmarks to compare the effectiveness of participatory budgeting in different cities, alongside budget allocation per resident, number of residents involved, numbers of projects per neighbourhood, consideration of neighborhood deprivation, and other measures. Some cities stand out as being more "generous" than others.

project (e.g. Rennes). The engagement process itself was sometimes perceived as empowering citizens. This was often the case of co-production approaches to participatory planning, where the DPP played a central role alongside in-person planning workshops. Although the Mini-Holland programme in Waltham Forest did not feature any formal power delegation as such, the overall public participation process was perceived as empowering, which fact was heightened by the contentious nature of the planning project. Responses concerning DPP use-cases that were associated with a significant co-production approach (e.g. Hambur; Oxford; Newcastle) also articulated empowerment in terms of process rather than formal decision-making, even when the process was ongoing (e.g. Oxford). Participatory budgeting projects were also portrayed as empowering both in terms of process and planning decisions. This dimension of process as empowerment is presented in more detail also in the sub-sections on the perceived influence of DPPs on planning, and collaboration between planning organisations and citizens.[32]

6.2.5 Contextual determinants

Thirty planning professionals at city agencies explicitly mentioned multiple engagement objectives, ranging from two categories to the whole IAP2 Spectrum. Typically, planning professionals also discussed a range of supporting and mediating factors that illustrated the context-sensitivity of the different engagement objectives. Typically, city agency staff used the platforms alongside other methods for public participation to serve multiple engagement objectives.[33] The sub-section also presents evidence of the context-sensitivity and planning professionals' own interpretations of the different categories on the IAP2 Spectrum.

A community engagement officer at Newcastle expressed that the overall engagement process entailed moving between multiple engagement objectives, either for specific engagement activities or at different stages of the engagement process. It also depended on the quality of the relationship between the city agency and the public, which could vary between different neighbourhoods in the city.

> I think part of the confusion is, the ladder diagram implies that you move from one rung to another [...] But any one piece of work can involve going up and down several rungs at different times. So, in order to be able to come up with some options or design ideas or some proposals, you might have to involve or collaborate with members of the public to define the scope of the issue or the problem. You might have to then go back to inform the inform rung to explain to the wider public and indeed to the ones that you have been working with, why particular options or proposals or ideas are being taken forward. […] So, in any piece of work

[32] See the relevant sections "Perceived influence on planning decisions" and "Workflows and planning processes"
[33] See the section "Ecosystems of tools for public participation"

> you can go backwards and forwards, between these different stages and there isn't always a clear progression from one to the other. It also depends on how sophisticated and mature your relationship is with your participants from the outset as well [*NewcastleUK-CE-senior1*].

Although the respondent answered in terms of Arnstein's ladder of participation because it was more familiar, the response stresses that rather than sticking to any specific categories, engaging the public entails continuously moving between the different categories.

The iterative, continuous nature of some engagement processes determined the use of multiple simultaneous engagement objectives. For a respondent at Toulouse metropolitan agency:

> [The platform] is very interactive and enables continuous communication between the different parties. That is, there isn't a particular time when we inform, a particular time when we do consultation (*concertation*) or co-production (*co-construction*); it is a continuous process. There is both the online portal and the in-person events, where residents can meet the winning candidates that were selected in a previous phase, and learn more about their project, ask them questions and also suggest ideas to them [*Toulouse-Project-manager*].

The DPP sometimes served a dual purpose of providing information and a medium for collaboration between participants. For example, in Amsterdam:

> By giving more information and direct connections to other stakeholders, there were more people informed and more people collaborated [*Amsterdam-Project-manager*].

A concern for transparency, accountability and trusting relationships with the public often motivated the desire to match engagement objectives with realistic levels of outcomes. For planning professionals, this imperative was often related to the presence of a clear public participation strategy, or the regretted absence thereof.[34]

Ten planning professionals explicitly mentioned that the ability to match engagement objectives with realistic levels of influence on planning required appropriate communication about the nature and scope of both the planning project and opportunities for public participation. At Nacka municipality, for instance, the design of *CityPlanner* at two different stages in the planning process required special consideration as to the purpose of the online engagement, as part of a wider ecosystem of engagement tools. An urban planner shared that it was difficult to assess the best way to engage, and match objectives with intended outcomes, with consideration to more formal means of providing comments to the municipality (e.g. via online forms on the council website or directly to planners where contact details were available).

[34] See also the section "Workflows and planning processes."

Regarding generalist/multifunctional platforms that functioned as multi-project engagement portals, planning professionals were usually unable to articulate the use of the platform in terms of specific engagement objectives (e.g. Paris & Grenoble metro; Boulder). The DPP facilitated different engagement objectives as most relevant per project. The platforms usually only hosted projects that city staff deemed would benefit from online engagement.

Regarding DPP innovation at the city of Gothenburg, a respondent provided a rule of thumb that one should only communicate to the public what one will later be able to deliver. The respondent regarded that the very act of communicating creates public expectations which will then need to be managed effectively.

Across all platform types, the design of the public participation process as whole, and the supporting range of participatory tools, informed the choice of the appropriate engagement objective. Regarding the use of *Carticipe* and *Cap Collectif* at Grenoble metropolitan agency, a respondent emphasised the role of the complementarity of tools as part of a wider engagement strategy:

> We use the tool within an ecosystem of other engagement [*concertation*] tools, and we utilise the complementarity between digital and in-person modes. So I cannot answer your question by saying: "on the spectrum, the tool is located at around this level" because it is not the tool which answers the question, it is the overall process that we will implement [*Grenoble-CE-manager*].

Twenty-nine planning professionals mentioned the need to adapt realistic engagement objectives as per planning phase. Planning professionals differentiated between early and later engagement phases. Early engagement was explicitly mentioned by 14 planning professionals as conducted upstream from any formal planning process. The aim was to inform later planning stages as part of a preliminary or early engagement phase. Geoparticipation projects were systematically conducted at an early planning stage. In Hamburg, Grenoble, and Nacka, they were followed up by a second geoparticipation survey for a specific consultation. Geoparticipation projects typically functioned as needs or perceptions analyses (e.g. all *Bästa Platsen*, *Commonplace*, *Social Pinpoint* and *Carticipe* cases). These enabled citizens to express their perception of specific places, related needs, land use preferences, and suggestions for development. In the Cities-4-People research projects in Hamburg and Oxford, *Maptionnaire* was used in a first stage to help identify the main issues experienced by citizens in relation to sustainable transport. In Oxford, the single platform iteration of the map-based survey helped to select the most in-need neighbourhoods for the research project. The survey results then informed coproduction workshops in these neighbourhoods. In Hamburg, the first iteration of the platform helped to identify the main issues experienced by commuters in terms of home-work sustainable mobility in one district of the city. The survey results also informed coproduction workshops (coined "mobility labs" and "mobility workshops"). In both Oxford and Hamburg, therefore, the online geoparticipation helped to launch both projects and informed subsequent

participatory planning efforts. In Skärholmen, the respondent indicated that the main objective for deploying *Bästa Platsen* was to enable residents to map their perceptions of the district and express needs and wishes in the earliest possible planning phase. In the latter, *early, non-statutory dialogue* served as the basis for geoparticipation, which objective also largely determined its expected influence on planning decisions. The citizen input on the platform was to be used as baseline data alongside other methods of public participation to help articulate planning orientations for the district as a whole. Subsequent planning stages would feature statutory public consultation first about plan proposals, and later about specific design proposals. In Spitalfieds, the views of the local community helped to inform and refine the different components of the Neigbourhood Plan for the area, which was then to be drafted and submitted to a local referendum later in the neighbourhood planning process. In Tours, *Carticipe* helped to map citizens' ideas and wishes for the development of the riverfront infrastructure that would shape the specifications for an international planning competition.

While most planning professionals highlighted the value of early engagement, engagement activities could also take place at later planning phases, for example to collect feedback about design proposals or drafts of planning documents (e.g. Nacka, Waltham Forest, Hexham, Newcastle, Raleigh, Grenoble metro, Lille metro). Engagement objectives had to be clearly communicated accordingly to avoid making false promises to the public about the expected influence of their input. In such instances, communication/information was often viewed as a preferable objective than consultation if the planning phase did not allow to consider citizen views, while increasing transparency. Twenty-eight planning professionals viewed that DPPs were used as part of an iterative public participation process. In particular, hybrid multifunctional platforms such as *Commonplace*, *coUrbanize*, *Stickyworld*, *Neighborland,* and all participatory budgeting platforms hosted public participation for the whole duration of a planning project, from launch to implementation, and sometimes even post-hoc evaluation.

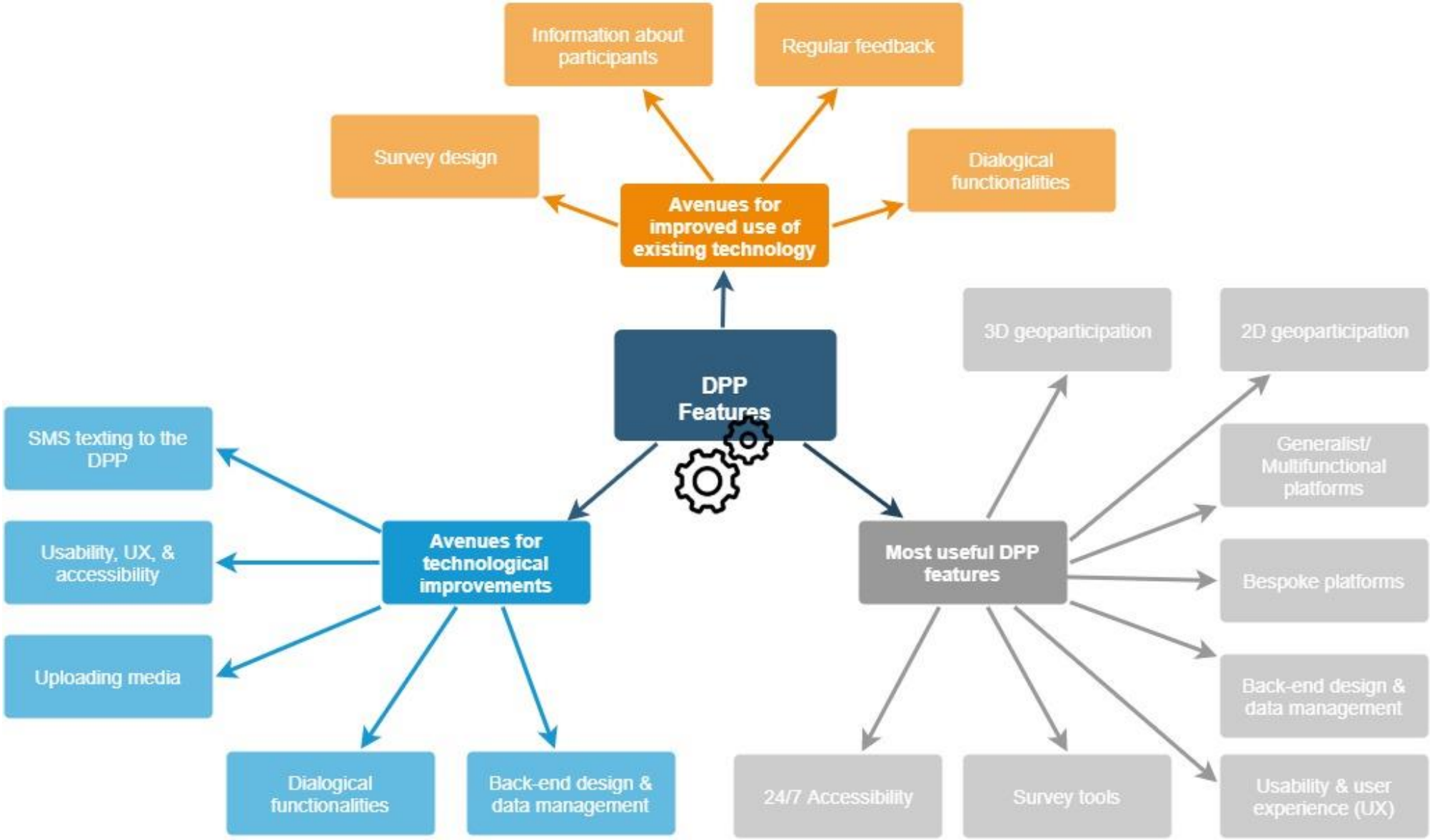
All projects investigated in the thesis featured a significant degree of innovation and experimentation in terms of both planning practices and technological applications. Some projects were distinctly experimental. These were nonetheless used in planning projects. Two 3D geoparticipation projects in Umeå served a dual purpose of eliciting feedback on preliminary design proposals and assessing the innovative 3D mobile-friendly applications through the feedback was gathered. Perhaps not intended as such, it seems that Transformcity in Amsterdam in effect became a multi-stakeholder collaboration and engagement experiment. Four projects were not immediately connected to a specific planning process. The use of *MinStad* in Gothenburg appears to be an exceptional geoparticipation project in that it serves as a continuous platform for knowledge sharing and functions as source of inspiration for the city staff. As such, it is not connected to any specific urban planning process. The *Commonplace* survey of community assets by STAMP, similarly, functioned as a celebration of local

culture rather than any specific development or plan. To some extent, the use of *PlaceChangers* for the Conservation Area in the Ouseburn valley (Newcastle) aimed to map heritage assets in the built environment ahead of any specific regeneration or development plan or strategy. Likewise, the Walkability study in Helsinki functioned as baseline data collection for future planning projects.

6.3 DPP features

This section addresses planning professionals' perceptions about DPP features. Figure 33 provides a thematic overview of the responses. The DPP features presented here primarily relate to two types of features: i) the back-end design and data management functionalities where these were available (e.g. on most hybrid/multifunctional platforms); and ii) participatory functionalities available to end-users/residents.

Figure 33 - Thematic overview of DPP features (responses from planning professionals)



6.3.1 Most useful DPP features

The following functionalities on the various DPPs were perceived as some of the most useful functionalities by planning professionals.

The back-end design & data management tool was one of the most important functionalities on the DPPs that provided it (except outsourced DPP services: e.g. *Bästa Platsen*, *Carticipe*, Bagneux PB). Twenty-three planning professionals highlighted the importance of the back-end data management and consultation design functionalities. Hybrid/multifunctional platforms that host several online consultation projects enable agency staff in different departments to access the platform directly with support from the community engagement team (e.g. Boulder). Clients seemed generally satisfied with the back-end design tools on *Neighborland*, *MetroQuest*, *Cap Collectif*, *Decidim* and *Commonplace*. The back-end data analysis and management tool on *Neighborland* and *Bang the Table* were also appreciated, particularly such functions as sentiment analysis based on natural language processing (*Neighborland*) or various querying functions to analyse citizen comments (*Bang the Table*). On *Cap Collectif*, *Commonplace* and *Maptionnaire*, data analysis was more limited and typically performed in Excel, although basic summary reports on *Commonplace* were appreciated. A user of *CityPlanner* reported that the back-end design tool was easier to use for the first iteration of the tool, with the new version being a bit clunkier.

The participatory map component was particularly valued for all planning professionals who managed 2D and 3D geoparticipation use-cases. It was typically used early in the planning process as perceptions or needs analyses (e.g. all *Commonplace* cases; all *Bästa Platsen* cases; most *Maptionnaire* cases). A respondent at Stockholm city found the map-based survey tool flexible in that it enabled to residents to provide short or more extensive contributions and seemed easy to use for most people. Depending on the platform, particular functionalities mentioned by professionals who used geoparticipation include the thematic place-markers and map-based filtering of comments, text-based and map-based surveys, the insertion of 3D volumes (users of *Carticipe*, *Maptionnaire*, *Bästa Platsen*, *CityPlanner*). At Lille and Grenoble metro, community engagement officers shared that the advanced geoparticipation on *Carticipe* was particularly useful for the metropolitan plan.

The single most useful functionality of 3D platforms was the capacity to visualise, navigate and submit contributions in a 3D environment (all *CityPlanner* cases). For a respondent at the city of Gothenburg who developed the *MinStad* application based on *CityPlanner*, 3D geoparticipation provides a clear advantage over 2D geoparticipation:

> The functionalities relate to the capacity to see a map in 3D, which is a totally different picture than a 2D map. One understands volume and understands the context in a completely different way, so this was what we developed from the start: there is a desire to experience the city in 3D, as this conveys things effectively. On a flat map, how can you tag things? It is difficult to relate to space and how things relate to each other. Same thing when submitting contributions

> [as resident], one can work in 3D. One can build with volumes to convey height. In this specific location I would like to be developed. Here I want a group of houses or residential block, or the like. [Residents] can actually create and insert those volumes themselves as proposals, which is much easier to understand and to communicate [*Gothenburg-Geo-manager*].

Likewise, the 3D component of geoparticipation was highly valued by a respondent at Nacka municipality, given the uneven topographical terrain in the district for which *CityPlanner* was used.

On multifunctional platforms that hosted several consultation projects, the salience of the geoparticipation tool depended on the type of planning project. At the city of Boulder, the map tool on *Bang the Table* was particularly useful for the rezoning of building heights:

> We asked the people to drop a pin where they want to preserve the view, because Boulder is in a beautiful setting, it has a mountain range backdrop that people want to preserve. That is interesting to hear where the community is maybe more open to allowing higher or taller buildings [*Boulder-Comms-Specialist].*

The tool was not necessarily useful for all consultations, however:

> So ranging from IT, to parks and recreation, to transportation. I think some of the departments that were some of our heaviest users were Planning and Public Works which is really big topic, because they have a lot going on. A lot of them could use that map functionality because they are very geolocation specific. Whereas something around Information Technology or Finance, that functionality might not be as relevant. I do think we get a lot of value out of that functionality [*Boulder-DigitalComms-officer*].

Eighteen planning professionals explicitly valued the general flexibility and customisability of DPPs. Importantly, the wide range of functionalities, scalability and flexibility of generalist/multifunctional DPPs transpires as their main advantage over other platform types. Depending on the platform, planning professionals who managed generalist/multifunctional platforms appreciated their function as centralised engagement portals and/or the wide range of functionalities which they provide (particularly users of *Decidim*, *Bang the Table*, *Cap Collectif*, *Stickyworld*, *Neighborland*, *MetroQuest*, *Commonplace*). Platforms like *Decidim* and *Bang the Table*, in particular, enable a greater range of functionalities. Multifunctional engagement portals can function as ecosystems of digital tools for a large range of planning projects. The responses indicated 'all-purpose' or 'all-rounder' portals can meet the range of engagement functionalities of combinations of different DPPs that are observable in some cities. As highlighted by some planning professionals, the strength of multifunctional DPPs is also their perceived weakness. While generalist platforms excel in terms of flexibility, some functionalities (e.g. geoparticipation, participatory budgeting) are less advanced than those on specialised and bespoke DPPs.

Beyond single functionalities, 28 planning professionals mentioned usability and user experience as important for platform administrators and/or residents. DPPs are typically designed as user-friendly and providing a satisfactory user experience, as software providers' business model rests on this

premise. For a respondent at the city of Toronto, the platform enabled to make participation more interesting:

> We are mandated to consult with the public at various milestones in the Study, however *Social Pinpoint* has allowed us to be creative and savvy with our consultations process [*Toronto-UrbanPlanner*].

For several DPPs, user experience improved over time. For instance, initial versions of *CityPlanner* used in Gothenburg and Nacka required end-users to download plug-ins, in contrast to the current version which is fully web-based and runs more smoothly. This requirement did not facilitate the optimal participation of residents, particularly for participants accessing the DPP from desktops at municipal libraries.

Survey tools, in one form or another, were used across all cases. All geoparticipation platforms functioned as map-based survey tools featuring thematic questions to guide citizen contributions on the map. Users of *Maptionnaire* and *Harava* also designed text-only surveys as part of a longer survey that also featured geoparticipation.

Finally, flexible participation and easy accessibility regardless of time and location was a common feature of all DPPs, which was explicitly mentioned by 11 planning professionals as an advantage of DPPs over in-person modes of engagement which are time- and location-bound.

6.3.2 Avenues for technological improvements

Planning professionals identified opportunities for technological development and improvements. They are presented in the order that seemed most important across responses. In particular, the back-end data management and data analysis tool, where available on the DPPs, was deemed to be the single-most important tool that required technological improvements.

The back-end data management tool was the main avenue for technological improvements, and was mentioned by 13 planning professionals. For platforms that lack it, planning professionals sometimes highlighted the need for one (clients of *CityPlanner*, *Social Pinpoint*). *Commonplace* users identified room for more elaborate back-end analysis of citizen contributions. Related to the latter, opportunities for technological improvements mostly concerned the improved integration of existing technology in planning workflows, rather than developing new fields of application. Augmented Reality, Virtual Reality, open data visualisation, and advanced 3D visualisation and geoparticipation were mentioned as fruitful paths for future technological development by planning professionals (e.g. Rennes; Montreuil; Lake Macquarie; Hexham; Clermont-Ferrand; Waltham Forest). However, responses dwelled on the necessity to improve back-end functionalities for easier integration in planning, particularly: data management, manipulation, visualisation and analysis (e.g. sentiment analysis and improved thematic filtering); automatic, push-button engagement summary reports; improved staff

collaboration opportunities and accessibility on the back-end; connectivity with other digital solution vendors; and interoperability of database across different DPPs. A robust and comprehensive back-end data management system, alongside responsive technical support from software providers, were identified as key components of the effective use of DPPs in urban planning.

Three planning professionals suggested selective access to the back-end design and data management interface, as opposed to a set-up that enables either exclusive or complete access to the back-end components. Compartmentalisation of access would enable to share the management of consultations projects with specific staff. It would thereby minimise risks of human error such as accidental deletion of data and help uphold GDPR data privacy requirements. A participatory budgeting officer at Clermont-Ferrand suggested that collaborative evaluation of citizen projects across departments could take the form of a shared, cloud-based database. A respondent at the city of Raleigh suggested the *Neighborland* platform could segment the back-end into sub-blocks for the advisory and each thematic groups respectively, while enabling aggregation of each groups' ideas and proposals to inform decisions taken by the city council. DPP management skills were also mentioned. One respondent at Nacka municipality expressed the difficulty to convince other colleagues to use the 3D geoparticipation platform, which was related to some level of competency in terms of 3D data management and familiarisation with the back-end design interface. A second respondent also mentioned the need for experienced staff to champion the exploratory use of 3D geoparticipation in different planning projects at the municipality. In other use-cases, planning professionals sometimes found the back-end design tool clunky or outdated in appearance. Four planning professionals described the DPPs as somewhat clunky or outdated in appearance and/or functionality.

On the end-user side (i.e. citizen/resident users), seven planning professionals highlighted opportunities to improve the geoparticipation component, including: the drawing functionality (where available), the range of geoparticipation functionalities and/or technical issues related to geospatial visualisation (Nacka; STAMP; Hamburg; Helsinki walkability; Lille metro; Bagneux). At Jyväskylä, the input data was valued despite the fact that it made the geoparticipation surveys longer. In Hamburg and Helsinki, the drawing of lines and polygons/areas was useful in some contexts, although planning professionals had the impression that groups of citizen participants found it difficult to use. In Hamburg, particularly, planners were not able to use the data effectively, as participants drew routes in different ways. Some users occasionally drew exact commuting routes, while others only drew general areas which were much less useable for spatial analysis. For the Helsinki walkability study, likewise, it could be inferred from participants' responses that some users experienced difficulties with the drawing functionality, while many others did not appear to experience any difficulty whatsoever. Three planning professionals expressed opportunities to develop some form of map-based or location-based tool to enable to add a spatial component to citizen contributions

(Montreuil, Grenoble metro, Malmö). Two planning professionals mentioned opportunities to improve DPP usability and user experience for a range of publics with special needs, including functionalities for the visually impaired and supporting speech-based interaction. The *Better Reykjavik* platform recently launched a speech-based functionality that allows users to speak their contributions/ideas rather than manually insert them, which seems to have proven successful in broadening participation on the platform. There were also technical difficulties for the visually impaired regarding the use of *Maptionnaire* in Hamburg.

Nine planning professionals expressed that the dialogical functionalities were underused by staff and/or residents. Hindrances could be technological and/or organisational. In terms of technology, several responses indicated more dialogical functionalities could be introduced as sometimes dialogue and debate were conducted separately from the platform (e.g. Espoo: *CityPlanner*). A *coUrbanize* user also expressed that the platform was not ideal for dialogue, and that dialogical functionalities could be improved. At the city of Bagneux, technological obstacles concerned the fact that the initial platform architecture did not allow the software provider to integrate dialogical functionalities on the same platform. Three participatory budgeting officers suggested the ability for project holders to upload various media more easily to provide a visual aid for their project idea on *Cap Collectif* (e.g. photographs, sketches, slideshows). Two *Commonplace* users also identified opportunities to enable the upload of various creative media (e.g. sound recordings, photos) for end-users/residents and platform administrators. The functionality of sending an SMS text message directly to the DPP was mentioned as an opportunity for development by a user of *Neighborland*, as it is available on other platforms (e.g. *coUrbanize*).

The absence of feedback/update provision functionalities was also regretted, particularly on geoparticipation platforms. Where the DPP service was fully outsourced to an IT or planning consultancy, there were limited opportunities for community engagement officers to provide feedback on the platform itself (especially concerning geoparticipation platforms). It could also be due to technical dependence on software providers to provide additional modules/functionalities on the platform. For instance, at the city of Bagneux, where the use of the participatory budgeting DPP was still fresh and largely experimental:

> For the time being, the digital [platform] remains exploratory, let's say, because we still do not have time to update it. We will try to do it soon[35] but it is true that it led to some frustrations for [the project holders] who still had no project status regarding their project. So people voted in the summer, and we still haven't provided any updates. We have to do it, but we don't have the

[35] The interview was conducted in December 2018, and the platform was updated in the following month(s).

> time. And then also that with outsourcing to a provider, it is the provider that designed the platform, but we would need to be able to amend and oversee it. I am not quite sure that we have been able to [*Bagneux-CE-officer1*].

For platform applications that already featured dialogical functionalities, planning professionals did not necessarily know how to integrate them into planning processes. Planning professionals at the city of Boulder expressed opportunities for the wider use of dialogical functionalities on *Be Heard Boulder* in terms of dedicating time and staff hours for exploration of those functionalities, and conducting a staff survey to assess organisational hindrances to greater involvement of and collaboration with citizens.

6.3.3 Avenues for optimised uses of existing technology

Besides technological improvements, planning professionals frequently mentioned improved uses of existing applications. Fifty-one planning professionals mentioned some DPP features that could be used better by staff at the organisation. Six planning professionals explicitly mentioned that avenues for improvements had more to do with the way the DPP was used than the DPP itself.

The use of DPPs was generally an ongoing process of learning, experimentation and exploratory application in different planning projects. This seemed to be particularly the case of generalist DPPs, as these were used for a wide range of consultations rather than one-off applications (Grenoble metro; Lille metro; Boulder). For instance, at the city of Boulder, community engagement officers in charge of the generalist platform were keen to evaluate challenges and opportunities experienced by city staff for the use of dialogical functionalities. This was motivated by an objective to further engage the public:

> Having a two-way back and forth conversation is not quite as clear [as one-way consultation]. How does that look online, and how do we do it? I think that is something in Year 2 of using the platform, we want to look back and say: What are the barriers in using these tools? How can we encourage departments to use them? And so looking at the higher end of the IAP2 Spectrum, how do we do more of the collaboration and consultation, as opposed to just those lower levels of engagement for this platform? [*Boulder-DigitalComms-officer*]

Related to the exploration of platform functionalities, there were sometimes uncertainties about how to use different functionalities on the platform, as opposed to survey tools that commonly used across the city agency. These uncertainties resulted from heavy workloads and lack of resources on the part of city staff.

Likewise, the community engagement team at the city of Bagneux would have liked the participatory budgeting platform to feature more dialogical functionalities and enable more expedient feedback and interaction with residents. This functionality would enable to provide a digital outlet similar to that provided during in-person events. Uncertainties were related to limited staff availability and the technology itself:

> We would have liked to have a tab on the platform, as they have in some other city, or a discussion thread below the projects to allow a real dialogue before the voting phase. Since we put everything online… We do have the project cross-fertilisation in-person event as they have in Grenoble where project holders get together and discuss their projects and so on. But this dialogical aspect with reflections and debates about the projects, we would have liked to have it online as well […] to have a real democratic approach. The digital and in-person should have been linked. But it is a bit difficult considering that we do not have the resources internally to have someone full-time to moderate the discussion thread and whatever else goes on. It was also difficult for our provider because of the way that they had built the platform. The discussion would have been on another website, and that would have been strange. They hadn't planned in advance. It was the first time they were doing a participatory budgeting platform [*Bagneux-CE-officer2*].

Extensive continuous learning also applied to participatory budgeting use-cases for both first time adopters and experienced city agencies.

Pertaining perhaps more to the design of surveys than to actual technology, a respondent for the use of *Maptionnaire* at the city of Hamburg was unsure how surveys could be best designed and used to optimise the participation of residents, particularly regarding the drawing functionality which generated significant volumes of data of disparate quality.

> I think for the survey it wasn't as successful a tool, because we had too many questions. I don't know if that is a problem with *Maptionnaire* itself, or if it is more a problem with the planning, that if you ask people to map one thing and then another thing [four times], suddenly it's a lot of mapping, and "What did I already put? What should I put now?" It gets mixed up [*Hamburg-Researcher*].

All planning professionals identified inclusion and representativeness as a key consideration. They repeatedly mentioned the need to collect more information about participants with a view to assess the representativeness of the participation on the DPP. Nineteen planning professionals explicitly shared that the demographic profile of participants was difficult to know. For various practical and data privacy issues, however, this was far from easy. Limiting issues had more to do with the practicalities of online consultation design than with the technology itself. Interestingly, several software providers viewed that DPPs enable mass participation but cannot guarantee representativeness, which can be obtained through other means, such as statistically significant surveys.

Ten planning professionals mentioned opportunities to provide more regular and/or better feedback to citizens. For these respondents, the ability to provide regular feedback and updates to the public depended more on staff at the planning organisations.

6.4 Ecosystem of tools for public participation

DPPs were typically used alongside other tools for public participation, as part of a wider ecosystem of tools. This section addresses planning professionals' mention of other tools for public participation. Figure 34 provides an overview of the tools that were mentioned. Forty-seven planning professionals

made explicit reference to the use of complementary engagement methods. Even where DPPs constituted the main channel for engagement, other tools were used as a supplement and to raise awareness about the DPP and the planning project.

Regarding *Decidim* and *Carticipe*, a respondent at Lille metro expressed the need to adopt multiple tools as part of an engagement strategy

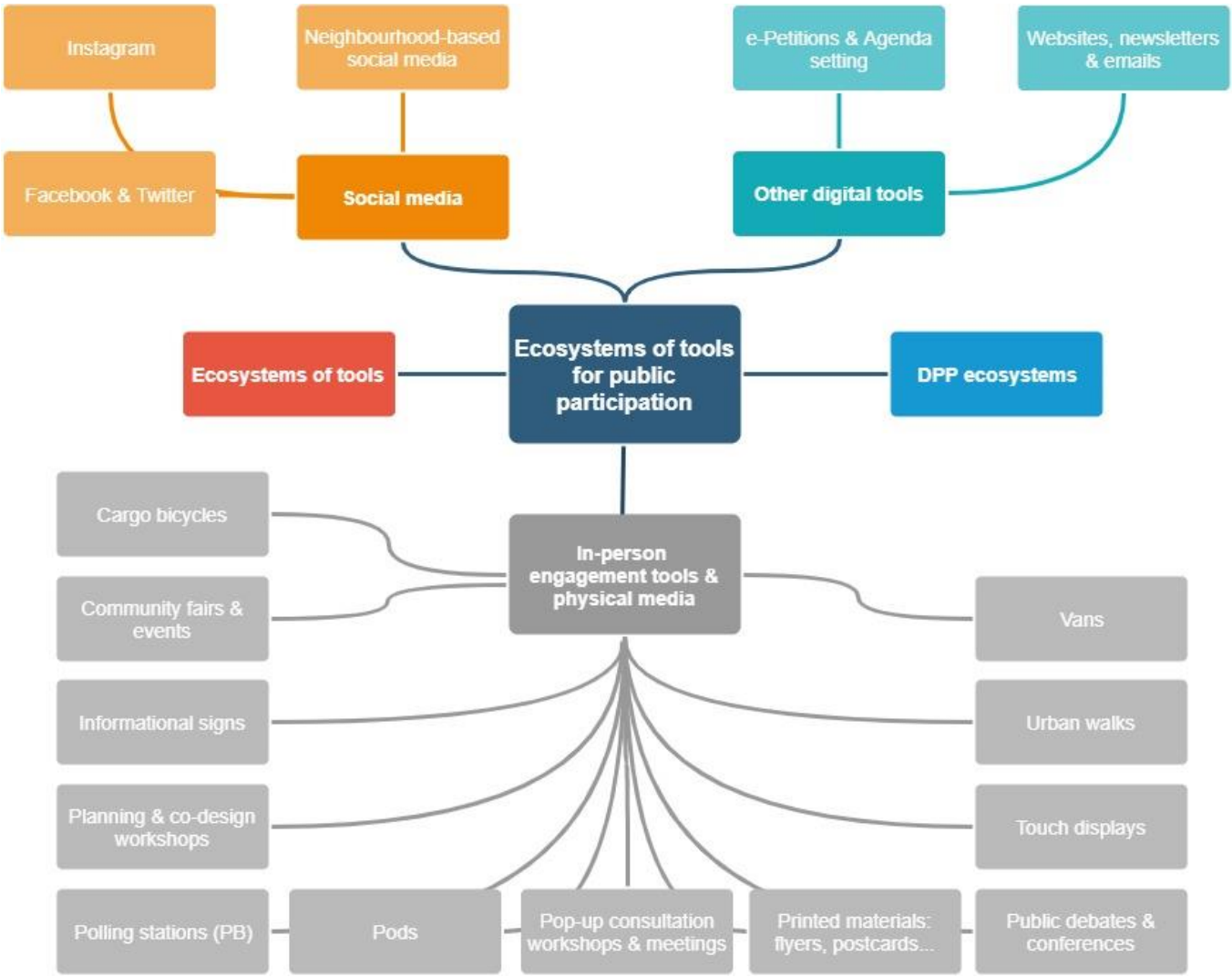
> The platform, in our view, is just a tool within an engagement ecosystem. It is not our only engagement tool. That is, we use it as part of a participatory method [‘*dispositif’*], in that it complements a strategy [*Lille-CE-officer-senior*].

A significant growth in the number of available tools in recent years was highlighted by several planning professionals. As city agencies experiment with a flurry of tools and methods for participatory urban planning, planning organisations should be cautious about how they deploy them. The respondent at Lille metro also identified the paradoxical risk of hindering participation by providing too many engagement opportunities:

> Today, I find that with the Civic Tech and [local democratic and civic] evolutions over the past 4-5 years, there is a large number of tools. Look also at the rise in participatory budgeting: it is a real underlying trend among local councils. So in my view there is something of a democratic movement that has taken place. The challenge today, as I see it, is to ensure their visibility, because it is difficult for citizens as well: with the participatory budgeting, metropolitan agencies coming into play, there are neighbourhood assemblies [and so on]. Too much engagement could kill engagement [Lille-CE-officer-senior].

A careful coordination of engagement tools therefore relates to the need for clear and effective engagement strategies, dynamics of DPP and public participation innovation, and the need to effectively manage citizens’ expectations.

Figure 34 - Overview of the complementary tools for public participation mentioned by the respondents (responses from planning professionals)



6.4.1 Ecosystems of DPPs

Eight city agencies adopted several DPPs for different engagement purposes. Their coordinated deployment can be conceived as ecosystems of DPPs, nested within wider ecosystems that combine in-person and digital tools. These are listed in Table 9. DPPs that are greyed out indicate platforms that were either mentioned by planning professionals but not thoroughly investigated in the thesis, or additional platforms identified through personal observation. Although selective, the table highlights the innovative combination of DPPs in different locales.

Table 9 - Identified ecosystems of DPPs at particular city agencies

Agency/client	Identified DPPs	Platform type	Hybridity & Innovativeness of DPP use
City Gothenburg (Sweden)	• MinStad (CityPlanner) • Maptionnaire • Pending application • Göteborgsförslaget	• 3D geoparticipation • 2D geoparticipation • Mobile-friendly portal? • Bespoke	• MinStad is the most comprehensive 3D geoparticipation portal identified • Maptionnaire used in Hammarkullen for neighbourhood regeneration • Co-design of future digital information & engagement solution • e-Petitions / agenda setting platform
City of Newcastle Ouseburn Trust (UK)	• Commonplace • PlaceChangers	• Multifunctional, incl. 2D geopartipcation • 2D geoparticipation	• Commonplace used for a wide range of transport-related projects across the council • PlaceChangers used for Conservation Area Plan by citizen-led trust (as well as for a regeneration project not reviewed here)
City of Helsinki	• Maptionnaire • Decidim	• 2D geoparticipation • Bespoke	• Maptionnaire for wide range of planning projects • PB platform (city-wide and area-based projects)
City of Grenoble & Grenoble metro (France)	• Cap Collectif • Carticipe • Grenoble PB	• Multifunctional • 2D geoparticipation • Bespoke	• Cap Collectif as engagement portal for metropolitan agency • Carticipe used for metropolitan plan, unprecedented levels of participation • PB platform (city-wide and area-based projects)
Lille metro (France)	• Decidim (following Cap Collectif) • Carticipe	• Multifunctional, incl. 2D geopartipcation • 2D geoparticipation	• Open Source platform Decidim used as engagement portal for metropolitan agency, following the use of Cap Collectif • Carticipe used for metropolitan plan (largest plan of its kind in France)
City of Toulouse & Toulouse metro (France)	• Myopencity • Dessine-moi Toulouse • Metro's engagement portal	• Multifunctional incl. PB • Bespoke • Multifunctional	• Engagement portal for the city of Toulouse • Engagement portal for development competition across metro region • Engagement portal for Toulouse metro
City of Paris (France)	• Cap Collectif • Paris PB • Paris petitions	• Multifunctional • Bespoke • Bespoke	• Engagement portal for the city of Paris • PB platform (city-wide and area-based projects) • e-Petitions / agenda setting platform

City of Malmö (Sweden)	• Malmö initiativet [Flexite] • Citizen views submission • Malmöförslaget	• Bespoke • Bespoke • Bespoke	• e-Petitions / agenda setting platform based on citizen ideation • Citizen views about the built environment on map-based form • Agenda setting platform

Although distinct, the DPPs were often linked to each other (e.g. Toulouse; Grenoble; Lille metro; Paris). For instance, at Grenoble and Lille metro, the *Carticipe* surveys were accessible from the *Cap Collectif* engagement portal. At the city of Paris, the wide range of public and civic participation platforms were listed on a specific page of the city's website. Similarly, at the city of Malmö, the bespoke platforms were accessible from the same webpage.

In Gothenburg and Malmö, DPPs were used for specific engagement purposes. It is unlikely, however, that a single platform could provide the wide range of tools with an equal level of depth as dedicated platforms that focus primarily on those tools. For example, a respondent at Lille metro mentioned that the geoparticipation tool on *Decidim* was more basic than that provided by the specialist geoparticipation platform *Carticipe*. The same respondent also viewed the participatory budgeting component on *Decidim* as less elaborate than on *Cap Collectif*, although there were no plans to conduct participatory budgeting at the metropolitan scale.

The same DPPs were also often used for a string of projects at the city agencies. Generalist/multifunctional platforms were most likely to be used for different consultations, as they can virtually host any number of consultations on the same application. This is particularly the case of *Cap Collectif* (Paris; Rennes) and *Bang the Table* (Boulder). Platforms with a Software as a Service (SaaS) license were applied to a wide range of separate consultations, either as part of a large series of related consultations, or series of stand-alone consultations (Lake Macquarie, VICRoads: *Social Pinpoint*; Bristol, Newcastle, Leeds: *Commonplace*; Umeå: *CityPlanner*; Jyväskylä, Helsinki: *Maptionnaire*; Espoo: *Harava*).

6.4.2 Ecosystems of tools to tackle digital and engagement divides

Two recurrent, overlapping themes among responses were digital divides and engagement divides. Respectively, these themes denote the fact that some publics do not engage online, if at all. Respondents repeatedly indicated the need to reach out to different publics in different ways. Special efforts are especially required to engage hard-to-reach groups. Commenting on the participatory budgeting at the city of Grenoble, a respondent viewed the value of a DPP lay in deploying it alongside other methods, and that effective engagement hinged on the use of a wide range of communication and engagement "spaces" or media, rather than any single tool:

> Digital tools are one means, one avenue or channel for communication, just as there are several others. There is no specificity to the digital. Some people never go online, and might not even know there is a website [where they can participate]. Some people don't know how to use the internet. […] Some people don't even go to community centres, so we reach out to them. Other people prefer online platforms for various reasons, and so they use these online platforms.
>
> This said, there are benefits to having an online platform: it enables us to engage beyond specific locations, and to easily set up polling stations in public space, thanks to the platform,

> and so on. But the real aim is to cover as much space as possible. Although the digital space is not 'topographical', it is nonetheless a type of space [*Grenoble-Elected-senior*].

Likewise, for the PB process at the city of Durham (NC), the combination of the DPP with multiple avenues for in-person engagement helped to address socio-economic inclusion and provide flexible modes of engagement:

> It was really important that we not only engage people of colour, but engage people that may not have the means to [attend in person events, and] meeting them where they were and also giving them the opportunity to engage outside of traditional hours. I think that was really important for us. So we had a lot of weekend and evening outreach, and I think that reduced some barriers for participation with groups that historically do not have the time or may not be aware of volunteer opportunities within the city [*DurhamNC-PB-officer*].

While planning professionals reported that DPPs facilitate broader engagement than more traditional methods, they were also critical as to their effectiveness in terms of demographic inclusion. For instance, a respondent in Lille viewed that DPPs were not sufficient to guarantee inclusion, nor did they guarantee the quality of citizen participation:

> [DPPs] do not facilitate the participation of the many: it is a tool that works well for people who are used to this kind of tool, either because they are used to take part in participatory approaches, or because they have some understanding of a metropolitan plan or spatial planning. But I think that it doesn't work as effectively for people who are quite remote from all these practices, if we do not support them by saying: "here is how it works, what it is for, this is how we will consider your contributions, how you can register," and so on; it is a tool that cannot function on its own. For those who are used to this kind of thing, it is simply a matter of inviting them, they grab the opportunity and they participate; they provide information, they give "likes" and so on. For those who are not used to these practices […] there is a perhaps a need for an information session to show how it works. I think this applies to all digital tools. So there is this issue of cultural capital at the level of residents: those who are used to these things, and those who really aren't. […] This needs to be considered when adopting this kind of tool [*Lille-CE-Consultant*].

At Grenoble metro, the use of *Carticipe* was embedded in a wider strategy that capitalised on an ecosystem of tools;

> As part of the overall engagement strategy for the metropolitan plan […] *Carticipe* is a building block, a structurally significant building block, but only one amongst many others [*Grenoble-CE-officer*].

At Waltham Forest, the value of the DPP lay in providing a unique engagement channel as part of a wide range of tools:

> It was not so much about the functionalities; it was more of a way to get people to feel they had a voice. These online tools should not be used on their own. They are just one of the tools you should be using for community engagement. They are very useful, they are very impressive, but they mustn't be used in isolation [*WalthamForest-Volunteer*].

Several city agencies used complementary methods to the platform to meet various demographic groups. Besides reaching out to the general public, urban planners often made dedicated efforts to

meet hard-to-reach groups such as minorities, immigrants, unemployed, and other disadvantaged groups that may experience digital exclusion and/or would not normally participate in urban planning (e.g. Skärholmen & Hagsätra: *Bästa Platsen*; Grenoble metro; Spitalfields: *Commonplace*; Raleigh: *Neighborland*; NYC Participatory Budgeting). Public meetings, drop-ins and/or street level outreach were held in deprived neighborhoods in several cities to counterbalance traditionally low levels of participation in these areas. In Bagneux, where 70% of residents live in council housing:

> The aim is really to "go to". That is, people will not necessarily come to us, but we can go to them and help them make use of existing policies. The aim is to enable them to submit projects for the municipality [*Bagneux-CE-officer2*].

In Durham (NC), city staff used a wide variety of channels to engage residents, with a view to keep the DPP at the core of the street-level outreach:

> Our idea collection phase was not paperless. [When we had] community engagement events, we had technology with us. We also did door-knocking and canvassing, so we had tablets on our staff that we check out when we do our outreach. All of that was part of our boots-on-the-ground approach as well as our online engagement. But it was all kind of technology-driven because we really wanted to increase exposure and access and increasing hopefully digital literacy throughout this process also [*DurhamNC-PB-officer*]

Specific planning projects adopted a digital-by-default approach to engagement, with the DPP providing the core of engagement opportunities. At the city of Paris, technical staff sometimes deemed unnecessary to conduct in-person engagement for some projects. Similarly, the use of *Commonplace* in Leeds constituted 95% of the engagement effort, with the remainder comprising of the common in-person engagement and awareness raising. In Montreuil, similarly, the participatory budgeting has been hosted entirely on the DPP, and in-person outreach helped residents participate on the DPP. For the first PB cycle, a digital by default approach was due limited staff availability:

> A paper version was a bit out of bounds in the sense that the initial participatory budgeting team consisted of just one person, which was myself. We could not rely on a substantial amount of resources. We needed a robust tool. Therefore, the digital tool, besides its considerable capacity for outreach, seemed unavoidable. We also wanted to deploy a digital vote to enable the majority of residents to vote, including young people. So it seemed quite logical to invest in the digital [*Montreuil-CE-manager*].

Even as the team grew with the subsequent cycles, the participatory budgeting remained online. In contrast, the participatory budgeting in Paris began fully online, and has since grown offline with increasing levels of in-person participation for project ideation and the voting phase. At NYC, similarly, the majority of votes are now done in physical polling stations, and the growth in resident participation takes place largely offline.

6.4.3 In-person engagement tools & physical media

A wide range of in-person engagement methods and physical media often supplemented the use of the DPPs in particular planning projects. Besides traditional in-person engagement methods such as public meetings which are often required by national statutory planning policies[36], planning professionals frequently mentioned a wide range of innovative in-person methods that go beyond statutory engagement requirements stipulated in planning policies. The listed tools were the most valued and/or mentioned by planning professionals. For the sake of clarity, the tools are listed alphabetically based on their type. Two main categories of complementary tools were mentioned: i) in-person engagement tools and physical media; and ii) other digital tools. These are listed in Table 10. Popular tools included planning workshops, pop-up stalls, targeted outreach methods, various printed materials, community fairs and events, social media as well as the use of traditional local government and project websites. Depending on the context, the various complementary tools enabled to reach out to specific groups (e.g. school children, youth, ethnic groups, local businesses, older people, homeowners, property managers etc.) and to engage the general public in diverse ways, as described in the previous section. The use-cases where the DPPs seemed to perform best where those that achieved synergies between a wide range of engagement and communication tools. For instance, in Raleigh, a sunflower festival attracted many visitors to Dorothea Dix Park and further raised awareness about the Masterplan by generating significant activity on social media. Notably, social media tools were key in raising awareness and attracting traffic to the DPP, or as a more dialogical complement to the DPP.

[36] Use-cases in the US are somewhat different in that respect, as planning policies are typically not federal and perhaps more voluntary than in other planning contexts. An international comparison of statutory planning policies is beyond the scope of this PhD thesis.

Table 10 - Complementary methods for public participation (responses from urban planning professionals)

In-person & physical tools	**Examples of cases**
Cargo bicycles	Skärholmen
Community fairs & cultural events *(outreach, awareness-raising)*	Raleigh, Grenoble metro, Waltham Forest Hamburg
Games for ideation and dialogue	Helsinki PB, Grenoble metro
Planning & co-design workshops	Grenoble metro, Lille metro, nearlly all PB cases, Oxford, Hamburg, Nikkilä, Waltham Forest, Newcastle
Pollings stations *(participatory budgeting)*	Paris, NYC, Rennes, Grenoble
Pods for small groups in public space	City of Toulouse & Toulouse metro
Pop-up stalls and workshops	Hexham, Durham (NC), city of Toulouse, Bagneux
Postcards, flyers, bookmarks	Grenoble metro, Lille metro, Hexham, Skärholmen, Hagsätra, Nacka, Paris PB
Streets signs for text messaging	Cambridge (MA)
Targeted engagement & outreach *(e.g. older residents, schools, youth, ethnic groups, property managers, developers, local businesses)*	Hagsätra, Skärholmen, Nikkilä, Täby, Grenoble metro, Waltham Forest, Spitalfields
Touch displays (in public space and places)	Nacka, Gothenburg, (expected for city of Toulouse)
Urban walks	Nikkilä, city of Toulouse, Lille metro
Van for pop-up engagement & outreach	Bagneux

Other digital tools	**Examples of cases**
Social media (Twitter, Facebook, Instagram, NextDoor)	Nikkilä, Espoo, Malmö, Spitalfieds, Leeds, Gothenburg, Grenoble metro, Raleigh, Toronto
E-petitions & agenda setting	city of Grenoble, NYC, Reykjavik, Malmö, Paris,
Websites & newsletters	Raleigh; projects for *Commonplace*, *Decidim*, *Cap Collectif*, *coUrbanize*

Social media could also be directly relevant for in-person workshops and participation on the DPP. For cultural heritage planning in Nikkilä, Instagram and *Maptionnaire* were complementary to each other:

> We used instagram at the same time as *Maptionnaire*, because people like to share their photos on Instagram. They had the opportunity to share them in the *Maptionnaire* questions also, but they did not do that much. They are still sharing pictures on Instagram with this special hashtag that we did for this project. We also had workshops with the people living in the area where we looked at the pictures that were shared on Instagram, and we put them on the map and in the timeline. We had them also place-based. It was fun, people found it fun, because there was a lot of old people involved who remembered: "oh this is this place" about when the pictures were taken.

Facebook was sometimes viewed as more dialogical than the DPP itself. At the city of Espoo, a planner viewed that the Facebook page for the planning project allowed to create a public debate which *CityPlanner* did not enable:

> *CityPlanner* works fine if it's not the only method. You'll need at least Facebook as a support to create a real debate.

Likewise, Facebook enables to create dialogical interaction between residents interested in the e-petitions plaform in Malmö.

In all, the sets of complementary tools used in each case contributed to raise awareness about the planning projects and/or the DPP itself, revealing strong interdependencies between the use of the DPP and complementary tools for engagement and communication. The various tools used by planning professionals alongside the DPPs helped to create ecosystems of public participation and contributed to transform planning workflows, as further detailed in the other results sections.

6.5 Summary

The findings in this chapter focus on planning professionals' responses concerning the objectives for public participation, DPP features, and tools for public participation. First, rather than favouring any single objective for public participation, planning professionals typically adopted multiple objectives. They also stressed the need to align objectives with realistic levels of influence to ensure the transparency of participatory processes and maintain or establish trust with citizens. Terms such as 'consultation' and 'empowerment' are value-laden and can be interpreted in different ways, depending on planning context. Consultation can denote both a specific objective that matches the IAP2 category, and as a general process of public participation. An important distinction also applies to empowerment conceived as power delegation or as shared decision-making. The implications in terms of participatory process are substantial, not at least in terms of managing citizen expectations effectively. Overall, the stated objectives for public participation seem to overlap considerably with perceived levels of influence. Therefore, the findings about objectives and perceived levels of influence need to be considered together (see the Results chapter about Planning decisions, processes and workflows). Collaboration and empowerment seem to be most closely associated with DPPs that support co-production and participatory budgeting. Informing is a widely recognised prerequisite for effective engagement. Effective communication and marketing constitute prerequisites to manage three types of urban planning contexts: i) high levels of digital and engagement divide; ii) high-level, strategic projects that are somewhat remote from citizens day-to-day concerns about their living environment; and iii) complex planning procedures, such as participatory budgeting.

Depending on the platform, the most valued DPP features include: i) the back-end data management and design tool; ii) geoparticipation functionalities (e.g. thematic place-markers, drawing, 3D

navigation, map-based surveys); iii) the wide range of functionalities on generalist platforms. More generic features that are widely appreciated include the DPPs' usability, flexibility, scalability and simple customisation, as well as the fact that they enable 24/7 access for citizen participants. Planning professionals also identified the back-end data management tool as the main area for technological improvement, or the creation of such a tool where currently unavailable. The possibility to provide only partial or segmented access to specific parts of the back-end data management and design tool was also desired to meet data privacy and improved collaboration requirements. Depending on the platform, planning professionals also identified improvements to dialogical functionalities and a wider range of functionalities. Interestingly, more than half of the respondents expressed that some functionality or other could be better used by the planning organisation. This indicates at least partly that the comprehensive use of DPPs has more to do with the way tools are used than with the tools themselves. Of course, the aforementioned technological improvement needs would be key to an improved use and integration of DPPs in planning workflows.

Beyond the use of DPPs, and in order to achieve the stated objectives for public participation, planning professionals routinely highlight the need to adopt ecosystems of tools for public participation. DPPs are no silver bullet to public participation. They need to be deployed alongside other tools for public participation and communication to help engage the traditionally 'hard-to-reach', i.e. those who digitally marginalised and/or do not normally participate in civic matters or urban affairs. The most popular digital tools across the use-cases seems to be social media, in particular Facebook and Instagram. Innovative digital technologies include interactive digital touch tables and displays in public space which can be used for informational as well as participatory purposes. When well used, social media referrals to the DPPs outperform all other digital sources of referrals. Various in-person, 'boots-on-the ground' methods such as festivals and street-level outreach are also popular. Cases also repeatedly made use of various types of planning and consultation workshops. Innovative methods for street-level outreach that were valued for their simplicity and cost- effectiveness include cargo bicycles, vans, and light-weight wooden pods. In-person or mail distribution of postcards and flyers was also deemed successful in raising awareness about planning projects and opportunities to engage on the DPP. Physical polling stations are also highly popular for participatory budgeting use-cases, and can account for the bulk of the growth in citizen participation in this type of participatory planning process.

The main organisational and institutional factors presented in this chapter relate to the need for clear engagement strategies that align objectives with achievable levels of influence. Appropriate guidance is also required to select the tools that can best support the engagement objectives. The findings about the organisational and institutional factors presented in the Results chapter 'Planning decisions, processes and workflows' chart key opportunities and challenges for translating objectives into

effective and efficient processes. This chapter also complements the Results chapter about software providers' perspectives.

7 Results: Planning decisions, processes and workflows

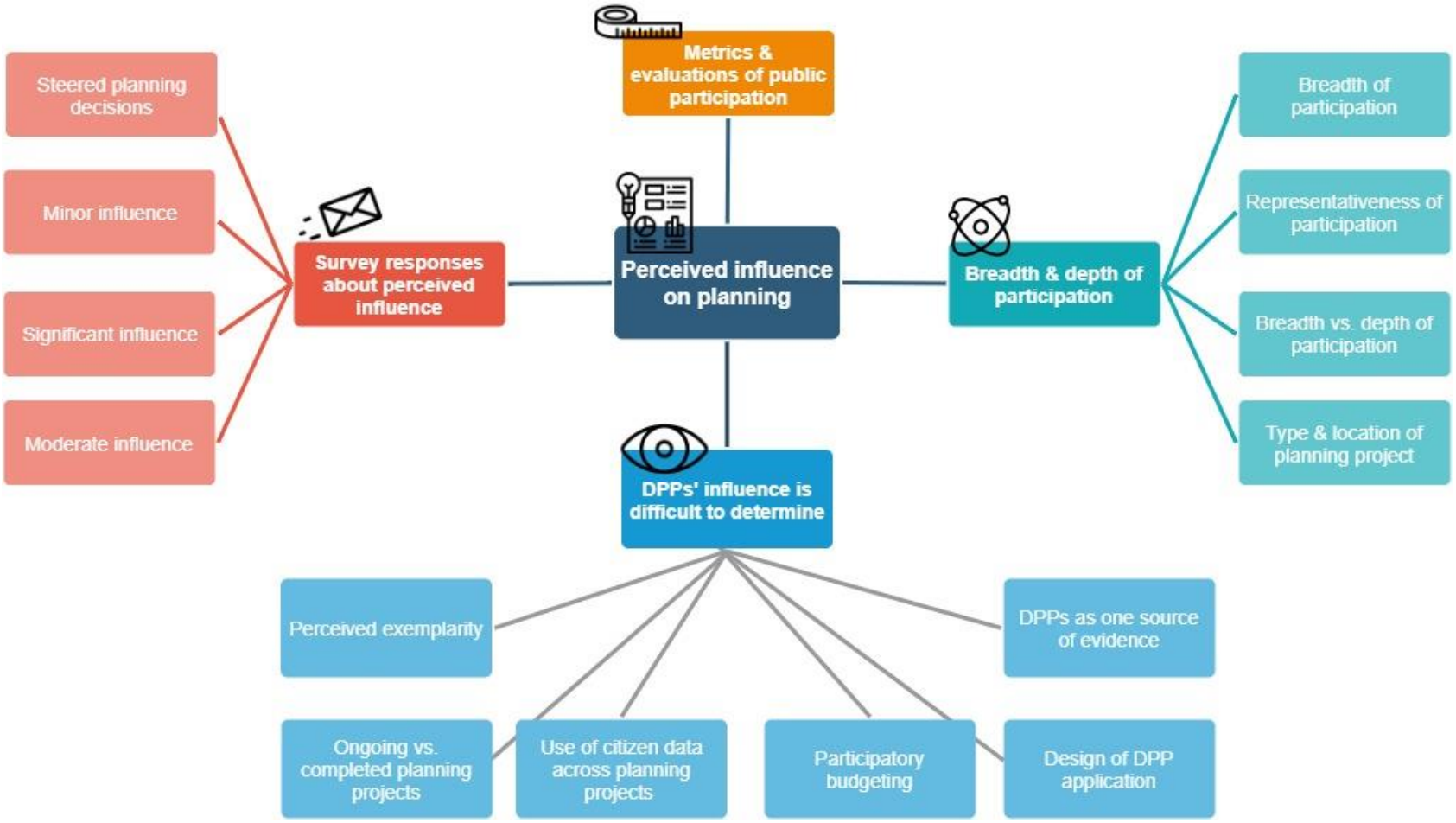
7.1 Introduction

This section presents the findings about the use of DPPs in urban planning that relate to planning processes and workflows. In particular, it dwells on the DPPs' perceived influence on planning decisions and their integration in planning processes and workflows. As such, this section considers the range of organisational and institutional factors that affect the use of DPPs. First, the influence planning decisions is addressed in terms of the difficulty of isolating the influence of DPPs relative to other sources of evidence, such as other inputs of public participation and other forms of evidence required in urban planning. Determining factors include the type of planning project, the breadth and depth of public participation efforts, and the availability of quantitative metrics and formal qualitative evaluations of participatory processes. Second, the manner in which DPPs are used in planning processes and workflows addresses the following organisational factors: DPP adoption factors; the availability of intra-organisational resources; the availability of public participation strategies; intra-organisational attitudes toward DPPs; organisational innovation dynamics; and opportunities for intra- and extra-organisational collaborative workflows. The main institutional factors identified relate to the capacity to manage citizen expectations in participatory planning and uphold standards of transparency. The latter institutional factors also hinge on intra-organisational capacity. All the identified organisational factors also bear important implications for the institutional background of participatory planning processes. The section ends with a summary of the main findings. The purpose of this section is twofold: i) to illustrate the interdependencies between the identified clusters of organisational and institutional factors; and ii) to highlight that the use of DPPs is inseparable from their organisational and institutional use-context.

7.2 Perceived influence on planning decisions

Respondents mentioned a range of specific organisational, political and technological factors that determined the DPP's perceived influence on urban planning decisions. Figure 36 provides a thematic overview. More often than not, it was difficult if not impossible to isolate the influence of DPPs on planning decisions. The range of determining factors mentioned by respondents pertain to the contextual specificity of the different DPP use-cases. These mostly concern the usability of the citizen input data, its representativeness, and the availability of formal evaluations of participatory processes. *Critically*, a full consideration of DPPs' influence on planning decisions is not complete without considering the findings that pertain to the objectives for public participation in the State-of-the-Art Chapter on Public Participation. Particularly, the interview respondents repeatedly articulated the perceived influence of DPPs by way of engagement objectives.

Figure 35 Thematic overview for the responses by planning professionals regarding the perceived influence of DPPs on planning



7.2.1 DPPs as one source of evidence among others

The interview responses repeatedly highlighted that the nature of urban planning projects makes it difficult to isolate the influence of individual data points. In many projects, the citizen input on the DPPs constituted a single source of evidence, alongside other methods for public participation, expert knowledge, and various technical planning restrictions. DPPs were only a considered as a tool among others, even where the DPP constituted the main engagement tool (e.g. Hexham; Helsinki: *Decidim*; Montreuil; Leeds). Thirty-six respondents referred to the fact that the input on the platform constituted some form of evidence base or data layer that would likely inform later planning stages and/or other planning projects. For instance, in Calgary, citizen input on *Social Pinpoint* was just "one data point." In Toronto, the DPP collected the preferences of residents for the area, although the decisions would mostly consider the outcomes of the Environmental Assessments and development applications. The citizen input on generalist platforms was also used alongside other sources of evidence by various city staff (e.g. Boulder). Therefore, the value and influence of citizen input collected via the DPP may be articulated in terms of its integration in various planning projects alongside other forms of evidence and planning information (e.g. planning regulation). Key components were the perceived quality and/or salience of citizen comments on the platforms. Respondents at Waltham Forest and Nacka, for instance, indicated that the thoughtfulness behind citizens' comments determined their salience for the planning project. Two respondents at Waltham Forest carefully considered whether citizens' views were backed with argumentation or were mostly emotional, given the contentious nature of the planning project.

The influence of DPPs on decisions in large-scale planning projects such as master plans, comprehensive plans and regional plans was particularly difficult to assess. DPPs were typically one of many forms of community engagement, alongside a wide range of other sources of evidence. Furthermore, long planning schedules made it difficult to isolate the influence of the DPPs, particularly if they were used early in the planning process (e.g. Helsinki; Jyväskylä; Hagsätra; Skärholmen; Spitalfields; Atlanta region; Nacka; Grenoble metro & Lille metro: *Carticipe*; Espoo: *Harava*). At the same time, respondents for such large scale projects repeatedly expressed satisfaction about the DPPs' capacity to generate valuable knowledge from citizens on a mass-scale that would help guide decisions in some way (e.g. Grenoble metro, Lille metro, Raleigh, Atlanta region; Helsinki; Lake Macquarie). Citizen input collected for large-scale projects such as metropolitan and master plans was likely to shape the design of future community engagement activities for specific projects that would translate these documents into tangible planning interventions (e.g. Grenoble metro; Lille metro; Raleigh; Atlanta region; Helsinki; Espoo: *CityPlanner*; Didcot).

Besides large-scale projects, citizen input was likely going to be used across planning projects that dealt with more targeted local interventions (e.g. Helsinki walkability; Nikkilä; Hamburg; Newcastle: *PlaceChangers*; Amsterdam). Citizen input for the Helsinki walkability study and on *MinStad* in Gothenburg, particularly, were to inform a range of future planning projects, and were not immediately linked to a specific project. Such cases illustrate that the long-term and interlinked nature of planning processes may not easily lend itself to time-bound qualitative evaluations. The difficulty to evaluate influence within specific timeframes may also be related to the long-term building of institutional capacity and trust between planning organisations and citizens (e.g. Newcastle: *Commonplace*; Skärholmen; Hagsätra), and collaborative workflows at planning organisations.

7.2.2 Design of the DPP application

Generalist/multifunctional platforms can normally be customised by clients for particular projects. Respondents repeatedly stressed the importance of the design of individual DPP applications. In Leeds, for instance, the DPP's use-value was not intrinsic to the tool:

> *Commonplace* is just a platform. There is still a massive expectation on the council, on the promoter, to populate that platform with the right materials, and to make sure you are asking the right questions. But you could have a great platform like *Commonplace*, but on one project you could produce really good material that people engage with, and on another site using the same software, you could use rubbish content that nobody engages with. And that doesn't reflect the software, the software is the same. For the same set of questions, you could ask really meaningful questions that help your design decision-making process on one project, and you could use the same software on another project to ask irrelevant questions, open-ended questions, and the data that you would get back would be useless. So *Commonplace* is just a tool and that is 95% of the success or failure of the consultation is still dependent on the promoter to use it in the right way [*Leeds-TransportConsultant*].

In Spitalfields, the inappropriate survey design of *Commonplace* was recognised in hindsight:

> I think it might have helped if the questions could have been more targeted, narrowing things down to the planning issues, not just general issues about what you like and don't like about this place. But I don't know the answer to it. I am just posing that would be a thing I am questioning myself, that [it] could have been done better [*Spitafields-Commy-leader*]

While the survey design was imperfect, the respondent also expressed that the platform "provided a solid base of data from which to prioritise issues, concerns and ambitions."

7.2.3 Specificities of participatory budgeting

Participatory budgeting use-cases, being more citizen-centred than other types of planning projects, were different in that respect. Nonetheless, the responses reveal that feasibility assessments of the citizen project ideas featured significant discretion on the part of experts and technical staff at the city agencies.

The complex exercise of benchmarking the influence and effectiveness of participatory budgeting process in different cities was the subject of significant debate at the French national participatory

budgeting conference in 2018. In particular, participatory budgeting professionals consider the following criteria: the percentage of total municipal capital investment, the proportion of allocated budget per resident, the representativeness of participants, and the number of projects submitted per neighbourhood/district for the voting phase. The most mentioned indicator is likely the percentage of the total municipal capital investment budget, for example 1% at the city of Bagneux, compared to 5% at the city of Paris. A respondent at the city of Montreuil shared that it was interesting to compare this percentage figure with the percentage of PB budget per resident at a municipality.[37] Taken together, these indicators can help determine the perceived level of influence that the process has in terms of participatory local democracy. In terms of the DPPs, metrics of participation are generally available, but these also require contextualisation. The responses for participatory budgeting cases in this thesis and the discussions at the French 2018 PB conference indicated a lack of objective benchmarks beyond the aforementioned context-specific indicators.

Some respondents viewed that, in absolute terms, the typically small scale of planning interventions and the relatively limited total budget allocated to participatory budgeting seemed to make the approach less influential than sometimes portrayed in various contexts (e.g. Montreuil; Bagneux). Other respondents viewed that opportunities to increase the PB budget could help raise its influence (e.g. city of Grenoble). For a participatory budgeting officer at the city of Montreuil, the fact that similar projects often had to be merged together enabled project holders to collaborate toward some form of public interest. However, the respondent viewed the overall process as largely opportunistic:

> In itself, participatory budgeting is not based on any diagnostic phase or needs-based analysis of a particular neighbourhood. It is more based on opportunity and the creative contributions submitted by people. But in my view, although it allows to decide on the allocation of 5% of the city's capital budget, in a way it kind of makes use of what is in excess. We are dealing a lot with wellbeing in the built environment, playgrounds, sports grounds and the like [*Montreuil-CE-officer*].

Except for city-wide projects that addressed social inclusion, the latter respondent deemed that neighbourhood-based projects consisted of small interventions that seek to improve people's immediate living environment as based on opportunism rather than on a formal, comprehensive assessment of residents' needs.

7.2.4 Perceived exemplarity of participatory processes

[37] The same respondent was hoping to compile a comprehensive list of indicators ahead of the creation of national participatory budgeting network as currently exists in other countries (e.g. in the US) to assess the influence of PB across different contexts.

Two noteworthy components of influence were: i) the perceived exemplarity of the participatory urban planning projects, including their recognition by other agencies or professional bodies; and ii) their integration in cross-cutting urban policies.

Specific neighbourhoods targeted by the Mini-Holland programme in Waltham Forest were deemed particularly successful by a volunteer, which attracted a wide range of visitors, including council officers and politicians. Notably, Newcastle City Council staff visited Waltham Forest and gathered inspiration for the Streets for People project, for which they used the same DPP. Success factors for the Mini-Holland programme were project- and process-related. Substantively, the scale of the area-wide interventions to improve active mobility in different parts of the borough were bold and unprecedented in a UK context. Process-wise, the modes and scale of community engagement were likewise a first for a London borough and in a UK context. Besides the Streets for People programme Newcastle, it is likely that the Mini-Holland/Enjoy Waltham Forest programme at Waltham Forest also influenced the Easton Priority street redesigns to improve active mobility in Bristol, either directly or indirectly. One of the survey respondents in Bristol mentioned that *Commonplace* was recommended by trusted sources and that they were not aware of any other online mapping survey tool. The interview with the software provider (*Commonplace*) also indicated that the Mini-Holland was the first of its kind conducted by the start up. The latter respondent indicated it was highly successful not only regarding the scale of the process, but also in its capacity to support every stage of the planning process.

Other projects have also received national and international attention among local councils and community engagement professionals (e.g. Raleigh: *Neighborland*; Helsinki master plan: *Maptionnaire*). The engagement for the Helsinki masterplan using *Maptionnaire* seems to have been a global first for the use of a PPGIS engagement tool at that scale, for that type of planning use-context. The same applies to the use of *Neighborland* in Raleigh, which generated unprecedented levels of engagement at the city level. The Dorothea Dix Masterplan was also considered the largest urban park project in the US at the time of the engagement process. Participatory budgeting pioneers in Western countries (e.g. New York City, Reykjavik, Paris, Rennes, Grenoble) have also provided inspiration for other cities nationally and/or internationally.[38] In France, the cities of Paris, Rennes, Montreuil and Grenoble are widely considered pioneers in participatory budgeting.

7.2.5 Survey responses about DPPs' perceived influence on planning

[38] The development of the Decidim platform and launch of participatory budgeting at the city of Barcelona (not investigated in the thesis) has also influenced a large number of cities across Europe, such as the participatory budgeting in Helsinki.

This section considers the survey responses exclusively. The survey responses were more explicit than the interviews about perceived levels of influence.[39] The specific findings are therefore presented separately here. There were 28 survey respondents in total. Three respondents did not provide any order of scale of influence but provided an open comment instead.

Eight survey respondents shared that the DPP had a *moderate influence* on planning decisions. The comments on the platform were often valued as evidence base for the planning process. For example in Örebro:

> The most common wishes for improvements and most appreciated places are an important baseline for investments in park development [*Örebro-EnvironmentalPlanner].*

In Espoo, citizen input on *CityPlanner* "partly supported chosen development decisions."

Likewise, in Piteå:

> Many views confirmed a pattern but sometimes there came new information which steered decision-making and prioritisation [*Piteå-UrbanPlanner*].

Seven survey respondents viewed that the DPP had a *significant influence* on planning decisions. Projects included affordable housing development (Southwark: *Mapping for Change*), a council-wide parking strategy (Lake Macquary: *Social Pinpoint*), street redesigns for active mobility (Newcastle: *Commonplace*), transit-oriented development (Atlanta-Decatur: *coUrbanize*), and participatory budgeting (Clermont-Ferrand: *Cap Collectif*). In Clermont-Ferrand, for instance:

> Residents decided by voting the projects that will be implemented [*Clermont-CE-officer]*.

In Newcastle:

> [*Commonplace*] was to support the method of co-production and consultation. It can localise and pinpoint exact locations that are not always picked up on general surveys. It also is helpful for others to see where issues are being highlighted, this can also let people agree with what people have identified. This allows us to build an evidence base [*NewcastleUK-CE-senior2*].

Six survey respondents deemed that the DPP had a *minor influence* on planning decisions. (Monash; Calgary; Whitebear Township; Cambridge (MA); Ashland; STAMP). In Ashland, a respondent expressed that:

[39] As discussed in the Methodology chapter, the question item about the perceived influence in the online survey was more constraining than the corresponding question item in the interviews, as survey respondents had to respond using a five-point Likert scale, ranging from "No Influence" to "It Steered Planning Decisions".

> The citizen boards still make the decisions. Comments on *coUrbanize* are not official testimony, but people think it is. It gives the illusion of participating, but is in fact, just a website [*Ashland-UrbanPlanner*].

In Cambridge (MA), the use of *coUrbanize* was perceived as yielding a minor influence on planning decisions for infill development. However, it facilitated more diverse participation, in combination with in-person engagement.

In Calgary, a minor influence was associated with the fact that few people participated on the platform. For the comprehensive plan update at Whitebear Township (MN), it was too early to assess the influence of map-based survey on the on-going planning process. For the open space strategy in Monash, the use of *Social Pinpoint* "hasn't resulted in a lot of changes to the strategy but will give us directions for implementation and setting priorities."

Four survey respondents viewed that the citizen input on the platform *steered planning decisions*. The responses display a diversity of views. These concerned geoparticipation platforms. For instance, in Tours, the citizen input on *Carticipe* guided the international development competition and influenced the metropolitan agency's interventions for the riverfront for the 2018-2019 period. In Bristol:

> *Commonplace* allowed the public to list and map their main barriers to walking and cycling locally. These issues then helped our design team focus our approach on interventions that would be more acceptable to the general public [*Bristol-Project-manager*].

Responses for the same cases were complementary or contrasting. Two respondents participated in the online survey concerning three cases: i) Täby: *Bästa Platsen*; ii) Monash: *Social Pinpoint*; iii) Bristol: *Commonplace*. The responses for the Bristol case differed. In Bristol, the respondents viewed that *Commonplace*'s influence was 'moderate' and 'steered planning decisions', respectively. Both respondents In Täby and Monash, one respondent in each case did not provide any order of influence. The open comments provided by the respondents in Täby and Monash overlapped rather than contrasted with each other.

7.2.6 Breadth & depth of public participation

One of the most commonly mentioned benefits of DPPs was their capacity and potential to reach more people with different demographic backgrounds than in-person methods. Rather than relating to any particular functionality, the potential for mass participation is related to the type of engagement which DPPs enable. This section presents the main supporting components mentioned by respondents.

Forty respondents explicitly expressed that the DPPs facilitated broader participation than traditional engagement methods in terms of numbers of participants and more diverse demographic profiles.[40] This insight emerged across all platform types, types of planning projects and geographic locations.

For a planner at Täby municipality:

> Online surveys are accessible to most people. This can influence participation [*Täby-UrbanPlanner*].

A community engagement officer at Grenoble metropolitan agency viewed that engagement levels achieved on *Carticipe*, in conjunction with other modes of community engagement, was unprecedented in the history of the city-region. For a planner at Toronto:

> Social Pinpoint has nicely complemented our in person outreach. We were able to promote our study online through Twitter, and reach a different demographic than usual [*Toronto-UrbanPlanner*].

Regarding the Lille metropolitan plan, online platforms are perceived to facilitate broader participation than other methods:

> They are really interesting tools because they allow more people to participate than simple public meetings or in-person workshops. Because participation is spread over time, because one can participate at any hour of the day, one can participate at home, one has time to think before submitting a contribution, and so on. Altogether, they are really interesting [*Lille-CE-Consultant*].

Interestingly, the same respondent also warned against the risk of relying exclusively on digital forms of engagement, and the necessity to adopt a wide range of tools.

Participants on the DPPs usually provided voluntary demographic information upon registration, which was therefore not systematic (e.g. Boulder; most *Commonplace* and *Cap Collectif* use-cases). Some municipalities generally could collect at least some basic demographic data participants (e.g. age, zip code/postcode, ethnic background) but it was far from comprehensive or systematic. Unsurprisingly, perhaps, income levels were the least directly collected demographic data. A practical issue concerned an apparent trade-off between requiring registration (with the associated opportunity to collect voluntary demographic data), and open participation without registration. Open participation was more likely to generate higher levels of participation in consultation projects and was common for some surveys on the DPPs. In rare circumstances, registration with citizen ID was required (e.g. at the voting phase for the Grenoble participatory budgeting).

[40] See also the 'Inform' and the 'Ecosystems of tools for public participation' sections

Information about participants often had to be inferred.[41] If participants provided a location or district of residence, then this could provide some form of insight about the typical demographic found in different areas of the city, including inferences (or informed guesses) about income levels and ethnic background. At the city of Durham (NC), a participatory budgeting officer mentioned comparatively high levels of participation from individuals of different demographic backgrounds, including an over-representation of youth, and substantial participation from Afro-Americans and Hispanics. The officer also noted significant participation in some deprived neighbourhoods. At New York City, a large number of immigrants also participated. In Gothenburg, although no formal demographic assessment of participation had been conducted, it was inferred that participation on *MinStad* enabled to engage a younger demographic (i.e. young people and actives) than more traditional modes of communication and engagement. In several cases, information about participants was most telling by virtue of citizens' *non*-participation. Even on basic platforms such as *Bästa Platsen*, some inferences could be made about those publics that did not participate, as participants typically disclosed their age and area of residence, as well as possible motives for visiting particular locations, which informed community engagement officers about possible demographic gaps to cover.

Contentious planning projects could generate substantial levels of participation. For example, large projects such the Helsinki master plan and a road bypass in Jyväskylä attracted many participants with opposing views. Likewise, active mobility projects in the UK were contentious by their nature and seem to have attracted large numbers of participants (e.g. Bristol; Waltham Forest). Although smaller in scale, the marketplace redesign in Hexham, likewise, generated some opinionated comments because of the expected alterations to motorised traffic flow in the town centre. In Newcastle, the *PlaceChangers* survey generated contrasting preferences about built heritage conservation. In Raleigh, citizens provided contrasting views about the different uses for the park masterplan, including competing approaches to ensuring its long-term financial sustainability.

DPPs were rarely portrayed as a silver bullet to broader participation. Significant efforts were often deployed to inform and raise awareness about the DPPs and other opportunities to participate in the planning process (see the results concerning the "Inform" engagement objective category). Likewise, at the city of Monash, the ability to engage more broadly via *Social Pinpoint* was the result of prior engagement at the municipality.

[41] At the time of the research, Neighborland seems to feature functionalities that are more advanced in collecting or making inferences about participants' basic demographic data than other platforms, on the basis of lightweight verifications and available browser analytics.

In rarer occasions, DPPs did not enable broader participation. Temporary technical difficulties with some DPPs may have influenced uptake by residents for some platforms (e.g. Bagneux; Hexham). Two geoparticipation use-cases featured low volumes of participation (STAMP; Calgary). Regeneration and urban infill projects in deprived areas or areas with a significant proportion of foreign-born residents could also feature relatively low participation due to language barriers or lack of familiarity with civic processes, despite significant street-level outreach and marketing (e.g. Skärholmen; Hagsätra). In Oxford, low participation from certain neighbourhoods helped to confirm areas most in need of smart digitally-enabled transport solutions. Problematically, low participation was a sign of digital divides which constituted a significant obstacle to the aims of the planning project itself. Experimental collaborative projects could also feature low participation on the platform, despite a potential for much greater involvement (e.g. Amsterdam). Related to the breadth of participation, the perceived representativeness of citizen input remained a core component of DPP's influence on planning decisions. This was particularly the case for large controversial projects that featured heavy investment and bore long-term consequences for the municipality as whole, such as for motorway infrastructure in Jyväskylä.

Although DPPs often enabled broader participation, they were not perceived to guarantee representativeness, even where various inferences could be made about participants' demographic background. For Atlanta's regional plan, mass input on *MetroQuest* was complemented with statistically significant telephone surveys about opportunities to improve transit. Incidentally, the latter telephone surveys also reached more people on that topic. A respondent in Waltham Forest was slightly critical of the value and representativeness of the comments submitted on *Commonplace*, particularly comments that were simply oppositional and poorly argued.

> For me, as a volunteer, I wanted more information. As an amateur enthusiast I would say, I need to understand the data, I need to know who responded. Do you know what I mean? I do not know whether there is enough data captured to say: Who's really engaging with this? Are we doing anything to get isolated people involved? Or is it just the people who've already got a voice [*WalthamForest-Volunteer*].

Given the inherent difficulty to collect comprehensive demographic data about participants on DPPs, the representativeness of participation is difficult to determine. Respondents sometimes stressed the need for such data, notably when connecting with decision-makers. Furthermore, the use of complementary tools usually enabled to fill some gaps in representativeness.[42]

[42] See the 'Ecosystems of tools for public participation' section

There sometimes seemed to be a trade-off between the depth of participation (e.g. duration of participation; skills required), and the breadth of participation (e.g. number and diversity of participants). Such trade-off required consideration in designing online engagement activities that were fit for purpose. In the geoparticipation use-cases that featured *Maptionnaire* and *MinStad*, the drawing tool enabled to engage residents more specifically than place markings. However, in two *Maptionnaire* cases in particular, participants seemed to experience difficulties in using the drawing tool, which impacted the quality of their contributions and may have limited the number of participants who submitted complete responses (Helsinki walkability; Hamburg). DPP design also required to consider the length of the online consultation which would affect the required time to complete it. In Jyväskylä, planners chose to create longer surveys to avoid engaging residents repeatedly and prevent engagement fatigue. Likewise, in Hamburg, the first iteration of the *Maptionnaire* survey was likely long. The number of online consultations and availability of other modes of public participation was feared to negatively impact participation for specific DPP use-cases. In the French DPP use-cases, a flurry of other modes of citizen participation exist that can create confusion or limit participation in any one mode. Respondents repeatedly expressed that lack of coordination among the engagement methods could potentially impact participation on the DPP negatively. Contrastingly, in Newcastle, a respondent expressed that such a situation of engagement fatigue had characterised pre-austerity days of engagement (i.e. in the 2000s) when lots of consultation were taking place, whereas austerity now meant that opportunities for public participation had been reduced both in scale and number. The high technicality of the participatory budgeting procedures and potentially more intensive levels of participation can also hinder broad participation, particularly for project holders and budget delegates/juries, as opposed to voters. Across the use-cases, however, the usability of the DPPs alongside in-person outreach and technical support from city staff generally staved off technical barriers to participation.

7.2.7 Metrics & evaluations of public participation

The ability to measure public participation is an essential component of evaluations of DPPs' influence. Metrics of public participation constitute one of the few objective measures of public participation. Metrics could consist of the following: number of registered users; number of ideas/proposals; number of comments on citizen contributions; number of likes/endorsements for ideas/proposals; and thematic overviews of contributions. Where available, the engagement summaries/overviews and metrics also ensured the transparency of the planning processes. The engagement summaries typically considered the public participation process as a whole, within which the DPPs played a key part. Metrics therefore facilitate benchmarking purposes and intra-organisational evaluation purposes. Larger city agencies produced comprehensive summaries of the public participation process for individual projects, including information about the DPPs (e.g.

Atlanta region; Grenoble metro; Lille metro; Raleigh; Helsinki masterplan). By way of example, one can mention public participation metrics for three noteworthy cases. At the city of Raleigh, 14,000 people participated on *Neighborland* over the 18-month engagement period, and a total of 65,000 were engaged through the overall process. Participants submitted 5,000 contributions, with an additional 1,000 comments over the two-week review of the final draft of the master plan. On the *Carticipe* platform at Grenoble metro, 1481 registered users submitted 2012 proposals and provided 15,000 votes (i.e. expressions of support or disagreement) and 1427 comments on those proposals. For the same DPP at Lille metro, there were 2,000 registered users, of which 625 individual users submitted varying numbers of contributions. Over 2900 contributions and 20,000 votes/endorsements were submitted on the DPP. Participants also provided 1389 comments about other citizens' contributions. Respondents for all three use-cases recognised the historically unprecedented high levels of participation achieved thanks to the DPPs alongside other tools for public participation. These quantified metrics enable to substantiate such claims. All participatory budgeting use-cases produced extensive and continuous metrics of participation.

The geoparticipation platforms generally enabled spatial and thematic visualisations of citizen contributions. The final survey maps were often permanently available. *Carticipe* was unique in its capacity to provide engagement statistics in real-time. Several platforms allowed to filter incoming comments per theme (e.g. *Carticipe*, *CityPlanner*, *Social Pinpoint*, MapSeed).

Generalist-multifunctional platforms usually feature engagement summaries (e.g. Lille: *Decidim*; Grenoble: *Cap Collectif*; Raleigh: *Neighborland*). *Commonplace* use-cases feature links to engagement summaries and/or display updates of the planning process on the platform itself, including the number of comments contributed to the platform. Large-scale projects often featured more comprehensive and detailed engagement summary reports (e.g. Atlantla region: *MetroQuest*; Raleigh: *Neighborland*; Grenoble metro & Lille metro: *Carticipe*). Rather than providing engagement summary reports, all participatory budgeting platforms featured extensive follow-up and updates about the different phases of each participatory budgeting cycle, including: the number of all submitted projects, list of projects eligible for the voting phase, and the stage of implementation of the elected projects.

A small number of city agencies elicited citizen feedback on the digital engagement process itself. City staff at the city of Boulder were to launch a public consultation about their one-stop digital engagement portal *Be Heard Boulder* as part of the evaluation of their first year trial with the new platform. In Umeå, several experimental mobile-friendly applications of *CityPlanner* featured a short feedback survey about the application itself. Atlanta Regional Commission elicited citizen feedback about the wider engagement process. These efforts were motivated by a desire to continuously

improve the way in which the agency engages residents. Similarly, an online consultation by the city of Paris sought residents' feedback about how to improve participatory local democracy.[43]

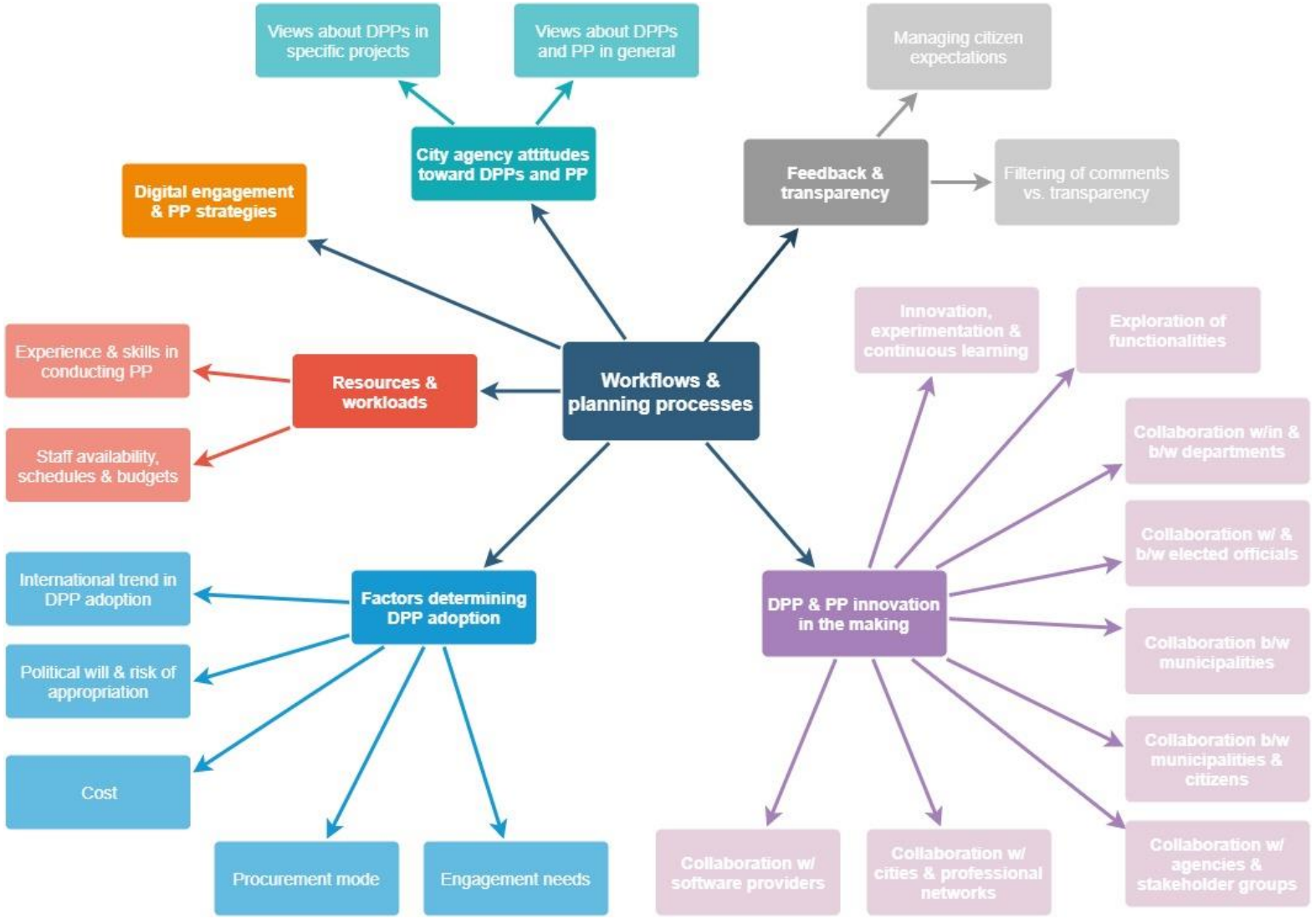
Most city agencies seemed to lack a formal citizen assessment of the public participation process itself, however. City staff mostly relied on personal observations of citizen perceptions of the platform, as gathered by them at public events or based on simple observation of the citizen input on the platforms themselves (e.g. all *Cap Collectif* projects; Grenoble metro; Lille metro; Newcastle; Waltham Forest; all *Maptionnaire* projects; all participatory budgeting projects).

7.3 Workflows & planning processes

This section considers the range of organisational factors that affected the use of the DPPs alongside other tools for public participation. Figure 37 provides an overview.

[43] The online consultation about participatory local democracy at the city of Paris is available here on the Cap Collectif application (idee.paris): https://idee.paris.fr/consultation/co-construction-dune-deliberation-citoyenne/presentation/la-demarche [accessed 21 September 2019].

Figure 36 - Thematic overview of issues related to workflows and processes mentioned by planning professionals



7.3.1 Factors determining DPP adoption

Engagement needs were often defined by elected officials by way of participatory local democratic principles and engagement strategies, and/or by planning professionals themselves. Engagement needs could concern specific projects (e.g. geoparticipation and several bespoke DPP use-cases) or a wide range of projects (e.g. most multifunctional DPPs). Engagement needs are closely linked to the engagement objectives. In turn, engagement needs led to clear specifications for the choice of DPP in procurement procedures. Engagement needs determined the use of specific features as per project and context, particularly for generalist platforms that hosted multiple projects.

Procurement occurred either through traditional procurement or an experimental trial. Traditional procurement was guided by a list of product specifications elaborated through expert-led, participatory and/or politically-driven means, which could be outsourced to a third party engagement or planning consultancy. Experimental trials were non-procedural and bypassed formal procurement processes, based on a desire to explore DPP technologies. City agencies opted to develop the platforms themselves in close collaboration with their general ICT provider, rather than procuring a DPP. In effect, 'in-house' technological development was seldom a fully intra-organisational development process; it was typically the product of collaboration between internal IT staff and an external IT specialist company (e.g. participatory budgeting platforms in Paris, Bagneux and Grenoble). The city of Grenoble's choice to move from a procured platform to develop its own in-house participatory budgeting application was motivated by a long-term cost-saving approach as well as greater control over the customisation, content and management of the DPP. In two research-led projects (e.g. Oxford and Hamburg: *Maptionnaire*), the choice of the DPP was made by the European consortium at the outset of the overall research project, and was to be deployed as per local context.

Cost was a key factor mentioned by 26 respondents at planning organisations regarding procurement processes and/or the use of participatory technologies in urban planning.[44] As seems common of local government procurement processes, city agency staff had a list of desirable product specifications that needed to be met within a specific budget, or based on cost effectiveness considerations. For example, regarding the selection of the platform for *Malmö initiativet*:

> The city of Malmö spends tax payers' money, so we cannot choose a company that costs more, so that is why we consider cost effectiveness. In this case all three companies [we had selected]

[44] See the sections "Resources and workloads" and "DPP & PP innovation in the making"

> met the specifications, and the platform was cheapest, so they won the procurement process [*Malmö-Comms-officer-senior*].

In several city agencies, the initial contact with the platform was renewed as part of a procurement process. At Grenoble metropolitan agency, the choice was made to renew the license with *Cap Collectif* after opening up a new procurement process:

> We gave ourselves the opportunity to change. But due to structuration issues related to the functionalities on *Cap Collectif*, and due to cost-related issues as well, we chose to continue with *Cap Collectif* [*Grenoble-CE-manager].*

The political will to foster innovation in public participation, particularly digital public participation, was a key driver for the adoption of the DPP across most cases. Across all use-cases, elected officials typically provided a general request to municipal staff to engage through a variety of means, including digital ones, while leaving the choice of actual tools to the responsible staff themselves. Even where guiding documents were more precise, the actual choice of specific DPPs was left to relevant city staff. Platform adoption typically occurred through procurement processes steered by senior urban planners and/or community engagement officers together with procurement staff. City staff responsible for the implementation of community engagement efforts could therefore set the product specifications for the procurement process. Such process necessarily had to observe the general political recommendations that set both the budget and availability of resources and staff. The latter pattern was found across all platform types, countries, and nature of urban planning project. Politicians sometimes expressed the desire to engage the public early in the planning process, while leaving the choice of tools to council staff (e.g. Hagsätra). In Gothenburg, politicians expressed a clear wish to promote a digital-first approach to service provision and public participation, and to be as transparent, accessible and sustainable as possible. The choice of the specific tools was also left to relevant council staff.

Platform adoption was also often expressed as the dual result of political will and the council staff's desire to reach out more broadly through a greater diversity of means (e.g. Toulouse; Boulder). Some respondents highlighted the risk of fostering the use of DPPs for their own sake, and related political risks of political appropriations of local democratic innovations. Some use-cases featured competing motivations and objectives for engaging the public through DPPs. In one geoparticipation use-case, in particular, politicians decided to keep the platform accessible to the public even beyond the timeframe during which city staff were able to process incoming contributions on the platform and consider them in the planning process. This was perceived by a respondent as an appropriation of the DPP for political reasons. The respondent regretted the implications of this decision on grounds of the formal transparency, accountability and local democratic principles which typically underpin the use of DPPs in local government.

Related to the adoption of DPPs, a community engagement officer also stressed the risk of considering DPP use as a political goal in itself:

> Regarding the issue of digital platforms and the local democratic political orientations, the current municipal team was elected with a rather detailed agenda. In this agenda, there was no specific reference to a digital platform. Which, by the way, begs the following question: when does a tool become an objective? In my view, a platform is not a political objective at all; it is a tool. Sometimes, one gets the feeling that a platform becomes a political objective, which as far as I see it reveals the lack of a clear underpinning objective or content. That is, form is not content. And a platform remains a sort of form. At least as I see it.

7.3.2 Resources & workloads

The resources required to conduct digital public participation and the related workloads incurred are some of the most prominent organisational factors that affect the use of DPPs by urban planners. Resources typically consisted of interdependent factors. First, these concern the time required to accomplish tasks necessary for effective public participation, as well as financial resources for purchasing marketing materials, participatory technologies, allocate staff hours, and to employ dedicated staff. Second, organisational factors relate to the skills and experience required for conducting public participation, particularly administration and moderation of DPPs.

All respondents mentioned staff availability as an important factor that affected the conduct of public participation within their organisation, including digital public participation more specifically.

In Örebro:

> Consultation [*dialog*] takes time and therefore requires resources. Well-conducted consultations are very important, but available resources (in staff hours) limit the scope of consultation. Elected officials and line managers also influence the scope in terms of the resources that can be allocated for consultation [*Örebro-Envt-Planner*].

Busy workloads for some city staff sometimes provided insufficient time for planners to explore and use all the functionalities which multifunctional platforms provide. The latter may be linked to a-priori uncertainties about their value and relevance to particular projects (e.g. Boulder). Exploratory uses of 3D geoparticipation also requires time and learning through trial and error, for example to upscale and adapt it in different planning contexts, which may sit at odds with the actual allocation of resources. Time shortage in terms of limited staff hours can impact the engagement team's ability to provide feedback to the public about the engagement process. For instance, limited staff availability for the participatory budgeting at Bagneux hindered their ability to provide formal feedback to the public on the DPP, even several months after the close of the voting phase. Tight planning schedules were also frequently mentioned. Common determining factors included economic drivers and/or political will. For the participatory budgeting in Helsinki, the ambitious schedule was such that the customisation of the *Decidim* platform was not complete when the first iteration of the participatory budgeting was officially launched in late 2018, which then led to some fire-fighting management of

technical difficulties. Likewise, in several participatory budgeting use-cases in France, the first iteration of the scheme was often rushed due to tight politically-driven schedules (e.g. Grenoble, Montreuil, Paris, Rennes), which sometimes affected the quality of the online engagement. For example in Rennes, the lack of a clear digital engagement strategy affected the use of *Cap Collectif* for the participatory budgeting, but also for the other online consultation projects on the platform:

> The participatory budgeting had to be organised, which was labour-intensive and also drew elected officials' attention, and we did not take the time, I would say, to develop a digital engagement strategy. So today, we do feel the need for it, that is something I can observe […] We still had the objective of conducting digital engagement. We made a few trials, which were more or less successful, including different online consultations, and I must admit it was not that straightforward [*Rennes-CE-manager*].

Key phases in the participatory budgeting process, such as the project ideation and voting phases, entail tight schedules for managing activity on the platform and during the in-person workshops as well as voting activity at the physical polling stations.

The availability of resources was often politically-driven and correlated with the need for a clear strategy or vision for effective public participation. For instance, in Nacka:

> Politicians have wishes. Nacka is a young municipality, it is curious, it wants to test new tools and solutions. Prior to that, we first need to have the patience to test it. A long-term vision is sometimes missing, that one seeks to build something. There can well be a desire to try something new, but then one can lose the patience to manage the output that one has put forward, its long-term value. It is important to have financial resources to take this work forward in time, and to have politicians that support this. There is certainly a positive political attitude, at least of sorts [*Nacka-UrbanPlanner*].

The allocation of financial resources and staff hours could also affect the use of the DPP's range of functionalities. In Waltham Forest, the the tight schedule for the active mobility schemes and set budgets influenced how the platform was used:

> I know Commonplace can do far more than what Waltham Forest used it for. Cost and time and all the rest of it comes into play [*WalthamForest-TransportConsultant*].

The need to moderate and respond to citizen comments was sometimes labour intensive. In Raleigh, both city staff and staff from the software providers were active in monitoring and responding to the large number of comments on the *Neighborland* platform. A respondent at Waltham Forest found that moderation on the platform was time-consuming. Besides swearing, which would be automatically deleted, there was a perceived need to constantly keep an eye on the platform:

> We had to make a call on whether we would accept those comments or [delete] them. So there needs to be a strong mediation of what is being said. And of course because it is instant, you almost need to be monitoring it quite strongly all the time [*WalthamForest-TransportPlanner*].

At the city of Bagneux, limited staff availability was one of the main constraining factors for improved moderation and management of the participatory budgeting platform. In Boulder and Nacka, limited experimentation with the use of the DPP features and their application in different planning projects. Finally, the impact of tight schedules on city staff workloads were exacerbated in the event of technical difficulties with the platform. This was the case in four use-cases (out of the total 61). These are kept confidential due to commercial and organisational sensitivity.

Respondents often mentioned the importance of having internal staff or outsourcing skilled staff with significant community engagement experience. For instance, in Örebro:

> [Besides other resources], competency and experience in conducting public participation are also important for the planning of consultations and the results these can deliver [*Örebro-EnvironmentalPlanner*].

Effective community engagement via the DPPs was sometimes mentioned as the result of previous experience of engaging the public. Regarding factors that influenced opportunities for public participation:

> Good planning! This has resulted from a number of years' experience of engaging with the communities. The right tools and techniques can help to maximise engagement, community interest and be clear and easy to understand and actively participate [*Monash-Planner-senior2*].

Individual respondents had had former experience with DPPs as community engagement or urban planning professionals. The DPPs included: *MindMixer* (e.g. Raleigh, Hamburg), *Bang the Table* (Hamburg), *Cap Collectif* (Lille metro), the now-obsolete *Nous Rassemble* (e.g. city of Grenoble), and other DPPs (e.g. Toulouse metro, Bagneux, Montreuil).

Responses also referred to the growing professionalization of community engagement. In French cities, the political city council boards have endorsed the creation of dedicated community engagement teams since 2014 (e.g. Rennes, city of Grenoble and metro, Lille metro, Paris, Bagneux, city of Toulouse). Prior to that, community engagement would either be conducted by internal staff, or outsourced to consultancies (e.g. city of Grenoble).

Accordingly, the use of DPPs was sometimes perceived to require specific skills and experienced staff to manage them. Although DPPs' back-end tools generally user-friendly, several respondents admitted they would be best managed by staff who were tech savvy. At the city of Malmö, the platform Flexite adopted in 2017 was a major step forward compared with the former e-petitions platform where all citizen comments had to be processed manually. Despite the alleged improvement, a respondent viewed that the platform was clunky and difficult to use, and that all such platforms are built for experts rather than communication officers and required users to adapt to the system rather than the other way around. At Nacka municipality, the effective use of the 3D geoparticipation

platform *CityPlanner* hinged on a handful of tech savvy staff with experience in 3D visualisation, modelling, and/or 3D data production and management. The future use of *CityPlanner* at the municipality was also framed in terms of the municipality's capacity to assign experienced staff and resources to such tools. Even where city agencies hired their own community engagement staff, a significant amount of ground level engagement and evaluation work was performed by engagement or planning consultancies (e.g. Lille metro; Grenoble metro; Atlanta region; Leeds). In the US, community engagement work is often outsourced to planning consultancies (interview with *coUrbanize*).

The availability of digital engagement and public participation strategies and guidance materials also enabled more effective and/or efficient workflows. City agencies generally adopted guiding documents for the design, conduct and evaluation of their various public participation efforts, including engagement through DPPs. These documents were typically the product of political deliberation at the city councils. Strategies and guidance documents could consist of: i) the range of appropriate engagement methods; ii) avenues for marketing and raising awareness; iii) harmonised engagement terminologies for internal and external use; and/or iv) various participatory local democratic principles (e.g. Boulder; Helsinki; city of Toulouse; Rennes; city of Grenoble; Grenoble metro; Lille metro).

The existence or absence of a public participation strategy seemed to influence the quality and experienced ease of conducting public participation with digital and in-person methods. At the city of Grenoble, the presence of a clear engagement terminology for internal and external use facilitates more effective and efficient organisational workflows. At the city of Rennes, notwithstanding the city's charter for participatory local democracy, a senior engagement officer viewed in hindsight that a detailed engagement strategy backed by clear methodological documents would have proved beneficial:

> I see that what would have been required is not only a digital engagement strategy relative to this particular new tool, but a global engagement strategy backed by a range of supplementary, project-specific guidance documents. […] We will work with the municipal departments to foster a culture of participation and develop comprehensive methodological guidance documents about public participation. These will also include a digital component. I think that, in order for this to function properly, there is a need for a clearer strategy to improve methodologies of participation internally [*Rennes-CE-manager*].

At the city of New York, participatory budgeting administrators produced and regularly update guidance material to help inform about and implement participatory budgeting process in the different participating districts of the city of use to other city staff and budget delegates. All participatory budgeting use-cases provide substantial online and/or printed resources to project holders, as well as training to budget delegates who help implement the process.

In two UK community-implemented consultations, the local councils seemed to provide contrasting levels of guidance. At the London borough of Tower Hamlets, council staff provided some guidance to the Neighbourhood Planning Forum with the different steps of their planning and consultation efforts. For the mapping of built heritage assets with *PlaceChangers* in Newcastle, it was less clear how much guidance the community trust was receiving from the council to help implement the Conservation Area Management Plan.

7.3.3 City agency staff's and officials' attitudes toward DPPs and participatory planning

Respondents at planning organisations mentioned a wide range of views regarding DPPs and innovations in participatory planning practices. Respondents were asked about their own views, as well as their awareness of the views of other municipal staff, elected officials and citizens. The views presented were often seen to affect the adoption and use of the DPPs at the planning organisations.[45] On the whole, respondents consistently shared positive views about the DPPs.

At the Atlanta Regional Commission (ARC), the *MetroQuest* survey was perceived positively as it featured survey content of relevance to several departments:

> When we were developing the Atlanta region's plan, one of the things we were really doing was trying our very best to bring all the various planning and regulatory functions that ARC has under one unified comprehensive planning umbrella. So with the *MetroQuest* survey, you are able to see we had a wide range of content about how we were developing our policy framework to guide the overall plan. So the various groups in our agency were appreciative of the fact that we were including content about their work: aging and health, water, security, and quality water supply, just as much as we were including work about transportation options. Staff from across the agency helped me prepare some of the questions and the ways that we wrote the survey. But I also feel they were really excited to get results back from it [*Atlanta-CE-manager*].

At ACT government in Canberra:

> [The use of *Social Pinpoint*] was a first for the ACT. People found it very affective [sic] and a great way to get involved. The process and method was highly complimented by participants and observers [*ACTgov-CE-manager*].

For participatory budgeting use-cases, negative perceptions mentioned by community engagement officers included views that citizens and elected officials submitted special demands that bypassed traditional workflows and procedures. This ambivalent dimension of day-to-day innovation in reshaping workflows and modes of participatory planning was common to all cases. Beyond the initial steep learning curve of the first year of DPP adoption, learning was a continuous process about

[45] See the corresponding sections "Factors determining DPP adoption" and "DPP & PP innovation in the making".

evolving technical modalities of the participatory budgeting process itself (Paris; Montreuil; , changes in platform adoption (e.g. Montreuil), and continuous product improvements for some platforms (e.g. *Cap Collectif, Citizens Foundation*).

Participatory budgeting at NYC incurred additional workloads over time, which led to mixed views about the process, although being seemingly positive on the whole:

> [*Interviewer*]*:* Among the city staff and politicians, are people generally supportive of it? Has there been a bit of resistance?
>
> [*NYC-PB-officer*]: It is a bit of a split. It is a lot of work, so a lot of the staff are hesitant to do PB work. It takes a lot out of us. But other than that, it is a bit of a split with politicians, some people like it and see the benefits. They see how we can engage youth and immigrant populations within the city and help people be more civically engaged. And then other people see it a bit as a waste of time, because it is very time consuming; it is a lot of work. It is a lot of work to know what people want to see in their communities. So it is a bit of a split within the city council currently. But for the most part, everyone we talk to thinks it is a really great idea.

In several cases across platform types, there was often some initial apprehension about the use of new digital engagement tools and participatory planning practices, which often receded over the course of experimentations and implementation (e.g. Rennes, Montreuil, Toulouse, Boulder). At the city of Toulouse, for example:

> [*Interviewer*]: Did you perceive any pushback from other departments, or from other elected officials?
>
> [*Toulouse-CE-officer*]: As there is a new tool, it is always apprehension around the new additional workload. And that is more of an apprehension. Regarding the principle, everyone agreed that engagement is necessary. But it was really an apprehension around the new workloads. This is why the "who does what" is very important for the methodology that we will develop for the platform. That is: who is in charge of moderation, who writes the content, who is in charge of providing feedback to the public? Regarding these stages in the engagement process, all departments are very mindful about where they fit in, and what their workload will be once a consultation will be published on the engagement portal.

Notably, the fact that DPPs were relatively self-moderating (i.e. that there were few abusive or offensive comments, or little spamming) was a factor in increasing their acceptance among the different departments and elected officials at the city agency (e.g. Rennes, Montreuil, Leeds, Waltham Forest).

Views about the platform could be linked with levels of participation on the platform. Two use-cases with a perceived low level of citizen participation were viewed in a less positive light by respondents (e.g. Calgary; STAMP). The initial use of *Cap Collectif* for thematic consultations alongside the established participatory budgeting yielded disappointingly low participation (e.g. Rennes), which view changed as the consultations on the platform became more well-known among citizens.

Respondents often had strong views about particular aspects of DPP use and/or participatory local democratic practices.[46] A respondent expressed some scepticism about proprietary engagement software, including generalist platforms:

> I am a slightly dubious about, as well as the fact that there was no political request for, you know, a rather generalist platform, where people can initiate a debate, ask questions and so on. […]. We did not create any such all-purpose platform, of the kind I have been able to see in other cities. I sometimes get the feeling that they are more about communication than participation. What is people's agency in the end? It is nice to launch a participatory platform, but the question that always springs to mind is: what power does that really give to people? *Concretely*? [*Grenoble-PB-officer*]

In Lille, a respondent also warned against the danger of using innovative DPPs for their own sake:

> One should be wary of [potential] misuses. The engagement tool should not be a media thing, or a marketing tool. These are things that are inherent to any engagement approach. I do not know what the situation is in other countries, but in France, this is often the criticism levelled against community engagement in general […]. Is the citizen's voice really considered in the project? Has it affected the project in any way? [*Lille-CE-Consultant*]

Some respondents mentioned interrelated restricting factors which affected the perceived value of DPPs and participatory planning practices. For example:

> In addition to [political/decision-making, austerity/government budget reductions, internal/organisational factors, and statutory consultation], there are other factors, including: scepticism about the value and role community can play in decision making; time constraints; and lack of understanding about community engagement methods, purpose and role and lack of trust between government and the community [*ACTgov-CE-manager*].

In some cases, resistance to participatory planning had less to do with the technologies and participatory approaches than with the nature of specific planning projects. Transport- and mobility related projects were often contentious. Respondents in the UK repeatedly mentioned resistance to changes in projects that involved active mobility. Some also stressed the importance of showcasing successful projects. For instance:

> Sometimes I think there is a bit of resistance to change, and I think it is because… Consultations for transport departments have always been notoriously difficult. Primarily because the big ones are the parking ones, and parking is more political than politics, and people can get very excited about that sort of stuff. So you always find those bizarre rules written around transport consultations, that certain percentages have to be hit in order for things to happen. And it is all based around the madness, the obsession with cars and parking outside shops to buy, all that weird stuff. I think doing things differently has certainly changed things in Waltham Forest. I do not think it is any coincidence that lots of other local authorities are now

[46] See also the sub-section "Factors determining DPP adoption" and the section "Ecosystems of tools for public participation".

> doing similar stuff, or I like to think it is no coincidence [*WalthamForest-TransportConsultant*].

7.3.4 Feedback & managing citizen expectations

City staff and elected officials were faced with varying citizen expectations about the DPPs and/or overall public participation process. Citizen expectations hinged on a range of factors, such as: i) the type and length of planning project; ii) the range and nature of citizen interests in particular locations; iii) expectations in terms of transparency, clarity, credibility and accountability of planning processes and decisions as an expression of local democratic principles; iv) related factors of digital divides, engagement divides, representativeness and inclusion.

Long planning processes required significant resources for informing and raising awareness among the public (e.g. Raleigh; Espoo: *Harava*; Helsinki; Atlanta region; Lille metro; Grenoble metro; Nacka). Respondents indicated that these urban planning processes are by nature longer than what citizens would expect them to be. Even for participatory budgeting processes which have a comparatively shorter engagement timeframe than other planning projects, the time gap between initial project ideation and actual project delivery could lead to relative disengagement or lack of understanding on the part of citizens (e.g. Bagneux; Grenoble; Montreuil; Paris). As a result, respondents often stressed the need for significant resources for awareness-raising, marketing and continuous feedback to the public as a means to secure the transparency, accountability and credibility of the process. In Waltham Forest, a respondent expressed that citizens needed to understand the nature and scope of the planning project so that they could align their own expectations with what was possible within the bounds of the various engagement activities, which was best achieved through in-person workshops. Citizens' expectation that participatory budgeting could lead to power delegation was sometimes the result of a lack of a clear public participation strategy. For instance, a respondent in Rennes stressed the need to communicate clearly on engagement procedures:

> The more distrustful will say that [participatory budgeting] is a demagogic tool that only informs, which is false. The more gullible will expect that it is a tool that will delegate everything, which is not what is happening. In fact, it is a much more nuanced and complex situation [*Rennes-PB-intern*].

Respondents repeatedly expressed the desire to increase the regularity of feedback to participants about the value of their contributions, and how these fit in the larger planning process. For the park master plan in Raleigh, for example, regular updates and feedback were provided to participants throughout the two-year engagement process. However, it was mostly the final engagement summary report that highlighted how all citizen contributions helped to shape the master plan as a whole. Likewise, in Boulder, city staff envisioned to provide more immediate and regular feedback to the public. The generalist/multifunctional and participatory budgeting DPPs featured significant

information and feedback in the form of timelines, updates and engagement summaries was provided on the platform itself.

7.3.5 DDP & PP innovation in the making

City staff were generally responsible for the selection, customisation and management of the procured DPPs, which entailed substantial innovation, experimentation and continuous learning. Furthermore, the use of DPPs was often associated with collaborative workflows. Besides their influence on planning decisions, the influence of DPPs can also be presented in terms of its influence on organisational workflows. In particular, the use of DPPs seems to have facilitated innovative forms of intra-organisational collaboration. The adoption and use of DPPs was also a medium through which direct collaboration with other cities and software providers could take place.

The responses revealed different interconnected aspects around the theme of innovation, such as novelty, experimentation and continuous learning. Planners' use of digital engagement transpired as continuous exploration, appropriation and implementation of the platforms through trial and error, particularly in instances where the platform was used for the first time as an experimental trial or one-off project (e.g. Toulouse metro; city of Toulouse; Bagneux; Lille metro; Spitalfields; Hexham; Newcastle: *PlaceChangers*; Boulder). Novelty and experimentation were often associated with supportive attitudes to the adoption and use of DPP at the planning organisations, and experience and skills in conducting public participation. For example the use of the 3D geoparticipation platform *CityPlanner* to support comprehensive planning was seen as innovative:

> Nacka is a very keen and young municipality. The organisation experiments with the use of new technologies and the like. Previously staff had worked with different engagement methods to involve citizens in urban planning but also experiment with new tools. The municipality had done engagement for a long time, but not with such 3D tools. It was something else to be able to visualise our urban development projects beyond our flat illustrations and map-based plans, and to insert 3D models and the like [*Nacka-UrbanPlanner*].

Where planners had used the platform over the course of several years, the continuous learning process also remained a core component of its use (e.g. Jyväskylä; Paris cases; Raleigh; Lille metro; Grenoble metro; Reykjavik; Waltham Forest). Planning staff who had acquired experience of DPPs in former jobs could support learning and innovation within the organisation (Helsinki walkability; Raleigh; Hamburg; Grenoble metro; Toulouse metro).

A key emerging component of innovation across the platform types is the interplay between DPP design and workflows at the planning organisations. City staff who were in the process of conducting their first iteration of the participatory budgeting, or had recently completed it, dwelled on the experimental dimension of the process in reshaping workflows and working cultures (e.g. Bagneux; Clermont-Ferrand; Durham (NC)). City staff with more experience also vividly recalled the demanding experiences of the first year (e.g. Montreuil; Rennes). Other city staff who had joined the

community engagement team a few year after the launch of the participatory budgeting also stressed the continuous learning and innovative components of the overall process, including evolutions in the use of the digital platform (e.g. Paris; Reykjavik; New York). There was a variety of creative and innovative ways to engage the public across the use-cases. The city of Bagneux, for instance, provided a support system whereby council staff members would serve as 'godparent' (or mentor) to help project holders at various stages including project development, campaigning among other residents, and project delivery. Because of the small number of projects voted for implementation (i.e. 9 projects for the whole city), there was significant room for collaboration between project holders and the participatory budgeting officers at the municipality, including at the implementation phase.

As the use of DPPs reshape workflows, the needs of agency staff typically change accordingly. The majority of interview respondents expressed opportunities for product improvements, some of which were delivered during the course of the engagement processes. Innovations in DPP technology and participatory planning workflows therefore seem to shape each over time. While DPP technology developments target better workflow integration, the use of the platforms sometimes contributed to reshape the workflows themselves. Greater collaboration between city staff within the same or across different city departments often resulted from the use of the platform. The sharing of the citizen input as GIS files or community engagement reports between council staff was one such way of improving communication and collaboration between different staff (e.g. Gothenburg; Helsinki; Espoo: *Harava*; Jyväskylä; Grenoble metro).

Where the community engagement staff were the sole administrators of the platform, staff in other departments worked in close collaboration with them to publish their community engagement projects as most appropriate per intended engagement objective (e.g. Paris: *Cap Collectif;* Grenoble metro: *Cap Collectif*). Dedicated platform administrators would also transfer citizen input to the appropriate departments at the planning organisation. In Gothenburg, for example, a large number of citizen comments on *MinStad* concerned transport and active mobility issues, and platform administrators at the planning department transferred these to their colleagues at the transport/highways department.

In some instances, respondents identified opportunities to improve communication between agency staff. Administrators of the engagement portal *idee.paris* at the city of Paris were sometimes unable to publish satisfactory updates about projects due to intermittent communication with the technical staff managing the consultations, which was accentuated by the disparate geographical distribution of technical departments and district town halls across the city. In other contexts, the hierarchical and physical proximity of the community engagement teams with the different departments fostered more effective collaboration (e.g. Grenoble metro).

Some of the advantages of limiting access to dedicated platform administrators, as opposed to opening up access to a range of city staff, were highlighted by two respondents. For a participatory budgeting officer at NYC:

> It is a lot of work but otherwise it would be too many cooks in the kitchen. And I want to make sure it goes through only a couple of people who review the input that we upload, and then we put it out. So it is better that we just do it, if it takes me two days to do it, then at least it is done. I do not have to pause for me waiting for a district to input something before we can go live, or anything like that, so it is better if I just do it myself [*NYC-PB-officer*].

Likewise, at the city of Paris, limited access to the back-end interface on *Cap Collectif* minimised risks of accidental deletion of other consultation projects by other city staff. Limiting access also ensured observance of the GDPR regarding user data privacy. This was due to the fact that the platform did not allow for selective compartmentalisation of the back-end tool. However, the community engagement team was initiating a wider reflection and assessment of how to improve collaboration across city departments and district town halls around the use of the platform, and in conversation also with the software provider.

Large-scale planning projects, such as master plans, comprehensive plans and metropolitan plans, typically generated city staff collaboration by way of the platform. For the Grenoble metropolitan plan, staff at the planning department regularly read incoming citizen input on the *Carticipe* plaform. An engagement officer for the metropolitan plan saw the latter as fostering a cultural habituation of participatory planning practices within the agency. This was further articulated through agency-wide collaboration and communication for in-person public participation events, which often featured the use of or reference to the digital platform. Similarly in Raleigh, multiple city staff collaborated around the *Neighborland* platform and in-person community engagement events that were advertised on the platform.

Collaborative workflows were often associated with heavy workloads, however. Undue workloads accrued from experimentation with new participatory processes, as was often the case with the first iterations of participatory budgeting (e.g. Rennes; Helsinki; Bagneux; Clermont-Ferrand). For example, following the close of the first PB cycle, a respondent shared that the process reshaped workflows at the city agency:

> The internal management was somewhat upset by the participatory budgeting (as a new governance system). For technical departments which evaluate and implement the projects it is a new way of working which is not always easy for them. We sometimes run counter to traditional workflows [*Clermont-PB-officer*].

Work pressure due to continuous innovation did not necessarily drop with time and experience. Participatory budgeting officers at Reykjavik and New York City reported significant work for technical staff as well as themselves, although both cities launched their first cycle in 2011. At New

York City, for instance, determining factors including the number of new districts joining the participatory budgeting process, and the growing need to provide support to city staff involved in the participatory budgeting process.

Urban development projects could also feature significant collaboration between different departments. In the *Bästa Platsen* projects for the revitalisation of the districts of Hagsätra and Skärholmen at Stockholm city, the overall planning strategy aimed both for broad community outreach and engagement as well as significant collaboration between the different municipal departments involved in the project, namely: the urban district administration, the urban development department, the environmental department, and the transport/highways department. In that context, *Bästa Platsen* was to inform the collaboration between the different stakeholders. The use of *Maptionnaire* at Jyväskylä (e.g. Motorway infrastructure) and Helsinki (e.g. Master plan), similarly, also fostered cross-departmental collaboration. Collaboration between departments could also take place around the explorations of new digital opportunities for effective communication and engagement between the city agency and the public. Staff at the city of Gothenburg were collaborating around the co-design of a citizen-focused, customisable digital solution to improve access to municipal services, including engagement opportunities. Likewise, at the city of Toulouse, collaboration between departments was to lead to the upcoming installation of digital touch displays in public space to inform citizens about local services, events and engagement opportunities.

Collaboration with elected officials was also common. In Reykjavik, the pioneer, non-profit *Citizens Foundation* platform emerged out of close collaboration with the independent mayoral candidate and comedian Jón Gnarr, following the 2008 economic meltdown that heavily damaged public trust in national and local politics in Iceland. In the French use-cases, elected officials with a political responsibility for local participatory democracy and related themes were often active in raising awareness about the planning projects and the DPPs (e.g. city of Toulouse, city of Grenoble). At the city of Toulouse, for example, the respondent was actively promoting effective ways of breaking digital and engagement divides at both the city and metropolitan level, and playing an active part in raising awareness about neighbourhood-based online consultations as well as the innovative development competition on *Dessine-moi Toulouse.* Collaboration between elected officials was not always optimal however. At Toulouse metropolitan agency, due to a short planning schedule, elected officials were not able to fully collaborate on a selection of suitable sites to redevelop as part of the innovative development competition. This said, the mayors of the different districts contributed to raising awareness about the different stages of the development competition.

In several use-cases, planning organisations benefitted from the experience of other cities' use of DPPs and participatory planning practices in multiple ways. This was particularly the case of participatory budgeting use-cases. For instance, in the first year of the participatory budgeting at the

city of Montreuil, the newly commissioned participatory budgeting team learned from and adapted the experience of staff at the neighbouring city of Paris, who advised them to adopt a digital tool.

> We replicated what Paris had done: we met the Parisian teams which conducted the participatory budgeting there. They told us immediately that a digital tool was essential, especially if we wanted to run the participatory budgeting without rallying a battalion of human resources (so to speak) to process the contributions [*Montreuil-CE-manager*].

Prior to the first cycle of participatory budgeting at the city of Helsinki, the participatory budgeting manager visited numerous cities to learn and draw inspiration from their experience. In particular, the PB manager visited Barcelona, where the *Decidim* platform adopted by the city of Helsinki was initially developed. Professional networks in the form of conferences, seminars, and personal encounters enabled to disseminate experience among engagement professionals, elected officials, software providers and researchers. For instance, several respondents hosted or attended various professional conferences about public participation, including participatory budgeting. Respondents in the French use-cases seemed particularly active in this respect and learned from colleagues in other cities at such events.[47] Elected officials in charge of participatory local democracy, community engagement directors, and software providers were keen participants at those professional networking events. In the UK, the city of Newcastle hosted a conference that dealt with community engagement, where the city's engagement team met staff from the Mini-Holland programme at the London borough of Waltham Forest which led to the adoption of the same DPP. Two European consortiums were mentioned by respondents which aimed to mutualise insight and investment into smart digital solutions for participatory and transparent forms of urban planning. The first consortium was the IRIS project, which is a partnership between several European cities, of which the cities of Gothenburg and Umeå were part of. The second was Cities 4 People, featuring the Oxford and Hamburg use-cases. Cities 4 People was more research-based and specifically targeted the development of sustainable mobility solutions. A more indirect form of collaboration between cities also occurred where product developments on the DPPs were mutualised for all users. For the open source platform *Decidim*, a network of developers at city agencies and planning consultancies develop modules which then became to the whole Meta*Decidim* community. For proprietary software like *Cap Collectif*, product developments commissioned by one city then become available to the whole community of clients, although development costs are not incurred by the commissioning city agency.

[47] Interrelated professional conferences mentioned by respondents in French use cases included the national participatory budgeting conference (where I got to recruit several respondents), le Grand Barouf' at the city of Lille, and the national conference on public participation (held in Grenoble in 2019). Other noteworthy conferences attended by software providers included the international TicTEC conference in Paris 2019, organised by the British software provider and think tank MySociety.

Collaboration with software providers was extensive in a handful of use-cases. For the Dorothea Dix Park Master plan at the city of Raleigh, senior staff at *Neighborland* was active not only in the providing and helping to moderate and manage the platform, they were also involved in communicating broadly about engagement opportunities. In particular, a co-founder of the platform native to the city was highly engaged in providing support for the DPP as well as the overall public participation process. Such personal involvement on the part of the software company leadership was highly appreciated by the community engagement staff at the city of Raleigh. In Reykjavik, *Citizens Foundation*'s local democratic activism coincided with the municipality's political agenda for greater inclusion, transparency, accountability and participation in urban planning and local policy making. The Open Source distribution of the platform reflects a strong identification with local democratic innovation on the part of the software provider. Many software providers being start-ups with a progressive work culture and ethos, several respondents experienced positive client-provider relationships. For instance:

> We really appreciate *Cap Collectif*'s philosophy. We pretty much agree with their vision of participation, which sometimes leads to slightly awkward work relations, *because they are almost more militant than provider*….This is to say that, normally there is a strange gap whereby, as public officers who say: "here, I have received a request from an elected official for a particular due date, and these are the specifications", sometimes we face a provider who replies: "No, this is not our priority, we already have something more important". Not quite! I am the boss; I provide the procurement opportunity! [With *Cap Collectif*, on the other hand,] it's fun, it's interesting, and it's also new ways of working [note: emphasis added] [*Grenoble-CE-officer*].

Similarly, for a respondent in Newcastle:

> I am a big fan of *Commonplace*. I am a bigger fan of the people who work there and their ability to innovate and respond and react, they are very open to designing things that meet our needs when we ask for something unusual.

More often, perhaps, collaboration with software providers was more centred on the product itself, particularly the range of functionalities of the DPP, and the related technical support. The agency of software providers is perhaps more explicit in the DPP design, in that each DPP facilitates a unique range of engagement capabilities. As such, the platform design actively contributed to frame the design of public participation, as was the case in Montreuil:

> The platform forced us to think and do things slightly differently [*Montreuil-CE-manager*].

At the same time, product-centred collaboration between city agencies and software providers also highlighted the clients' freedom to use the platforms as they chose. Platforms that lacked a back-end design interface (e.g. *Bästa Platsen, Carticipe*) provided less freedom to clients to design surveys themselves, whereby software providers not only customised the DPP applications but also analysed the citizen input.

Technical difficulties can impact the relationship between software providers and client organisations. In two use-cases, collaborative relations between the city agency and the software provider suffered from technical difficulties with the back-end platform management, which occurred at an unfavourable time in the planning process. The technical difficulties were coupled with low responsiveness from the technical support staff at the software company. Thankfully, these difficulties did not affect outward interaction with the public. In a third use-case, a temporary unavailability of the platform at the launch of the initial public consultation may have had some effect on public participation rates, but it did not affect client-provider relationships negatively, perhaps because of the longer duration of the public participation process.

7.4 Summary

The chapter illustrates how the use of DPPs can influence planning decisions as well as organisational workflows. Isolating the influence of DPPs on planning decisions is difficult, if not impossible. This is due to the complex nature of urban planning projects. In particular, participatory planning processes must consider a range of evidence that include but stretch well beyond citizen input. Due to the delegated decisional component of participatory budgeting use-cases, these can be associated with higher levels of influence planning decisions, although this remains a point of contention among respondents. Notwithstanding, the following key factors help to describe DPPs' influence on planning decisions. A common denominator across the use-cases is that the DPPs constitute one valuable source of input among several others. Influence relates to the manner in which citizen input can be used across multiple planning projects. The design of the DPP application is also primordial in that effective engagement is not only related to a tool's intrinsic features, but perhaps more importantly with how a particular application is designed by platform administrators and deployed by them. The design of the participatory process also seems to determine the breadth (i.e. number and demographic diversity of participants) and depth (i.e. intensity and type of interaction) of digital participation. Information about participants can be obtained in various direct and indirect ways, of which the most effective ones depend on platform administrators' own customisation of online consultations. The ability to measure participation activity on the platforms through quantitative metrics appears to be the single most objective way of evaluating and benchmarking the scale of participation across DPP use-cases. The representativeness and quality of citizen input also relates to institutional factors such as digital divides, trust between local government and residents, and public perception of planning projects. Contentious cases that dealt with urban infill, active mobility and motorised traffic generated substantial citizen participation characterised by conflicting views.

Beyond planning decisions, DPPs' influence on planning can also be addressed in terms of processes and workflows. Interestingly, existing workflows both determine and are reshaped by the adoption of

and use of DPPs. This recursive dynamic of DPP use appears to be a key component of their innovative use in urban planning. The two main organisational drivers of DPP adoption identified include platform cost and political will/determinacy. The latter stand alongside the range of DPP features as the main selection criteria (as presented in the Results chapter "DPP features"). Organisational factors that determine the use of DPPs point to time (i.e. staff availability) and material/financial resources, the engagement skills and experience of hired staff, and the availability of clear guidance materials and documents, include engagement strategies. Effective management and administration of the platforms by staff requires substantial time and effort. Factors that are more institutional in nature include the views of city agency staff and officials about DPPs and public participation. Responses revealed a diversity of views from administrators of the different DPPs, and from their colleagues in other departments within their organisation. A rule of thumb seems to be general apprehension about increased workloads arising from the joint adoption of DPPs and related participatory processes. Such apprehension seems to be systematic for project types such as participatory budgeting. The apprehension may be real or unfounded depending on context. It seems that both the DPPs and the participatory processes they facilitate instigate new collaborative workflows both within and beyond the organisation. Such new forms of collaboration can be perceived as both demanding and rewarding by agency staff. Technological failure can lead to undue stress and frustration in such circumstances, particularly if occurring at critical moments in a planning process. In outstanding cases, planners view that software providers actively participate in co-leveraging DPP applications in the field, and/or in fostering unusual collaborative relationships with staff at client organisations. Professional networks may also constitute a special resource for agency staff regarding DPP adoption and best practice.

In all, the chapter reveals that DPPs' perceived influence on planning decisions and processes is inseparable from their use-context. These findings complement the findings that pertain to DPP features, tool ecosystems and objectives for public participation. The findings in this chapter also reveal some of the interdependencies between organisational and institutional factors, particularly between the type of planning project, DPP design, levels and quality of participation, organisational resources, political support, intra-organisational innovation capacity, relationships with software providers, as well as the support provided by networks of engagement practitioners.

8 Results: Software providers

This chapter presents the perspectives of thirteen software providers obtained through semi-structured interviews. The participants each represented a specific company. The participants worked at the following companies, listed by alphabetical order: *Bang the Table* USA, (Spacescape (which supplies *Bästa Platsen)*, *Cap Collectif*, Repérage urbain (which supplies *Carticipe-Debatomap*), *Citizens Foundation*, Agency9-Bentley Systems (which supplies *CityPlanner*), *Commonplace*, *coUrbanize*, Mapita Oy (which supplies *Maptionnaire*), *Neighborland*, Open Source Politics (which supplies *Decidim* in France), *Social Pinpoint*, and *Stickyworld* (now Convers). Table 11 lists of the use-cases that correspond to the interviewed software providers.

Table 11 - List of software providers from whom interview responses were collected

Name of software	**Name of software provider**	**Location**	**Investigated use cases**
Bang the Table	Bang the Table USA	USA (HQ in Australia)	Boulder (*Be Heard Boulder*)
Bästa Platsen	Spacescape	Sweden	Täby, Örebro, Skärholmen, Rågsved-Hagsätra
Cap Collectif	Cap Collectif	France	Montreuil, Clermont-Ferrand, Rennes, Paris (idee.paris), Grenoble metro
Carticipe-Debatomap	Repérage urbain	France	Sherbrooke, Grenoble metro, Lille metro, Lille metro
Citizens Foundation	Citizens Foundation	Iceland	Reykjavik (*Better Reykjvik*)
CityPlanner	Agency9-Bentley Systems	Sweden	Gothenburg *(MinStad*), Umeå, Piteå, Espoo, Nacka
Commonplace	Commonplace	UK	Waltham Forest, Newcastle, Leeds, Bristol, STAMP, Didcot, Spitalfields
CoUrbanize	CoUrbanize	USA	Ashland, Cambridge (MA), Tewksbury, Atlanta-Decatur
Decidim	Open Source Politics (France-based provider)	France	Lille metro (*plateforme de participation citoyenne de la MEL*); Decidim also used for Helsinki Participatory Budgeting
Maptionnaire	Maptionnaire	Finland	Helsinki (Masterplan + Walkability), Jyväskylä, Nikkilä, Oxford, Hamburg
Neighborland	Neighborland	USA	Raleigh (*Dorothea Dix Park masterplan*)
Social Pinpoint	Social Pinpoint	Australia	Lake Macquarie (Parking + Warners Bay), ACT, VICRoads, Toronto, Calgary, White Bear Township, Monash
Stickyworld	Convers (formerly Stickyworld)	UK	Hexham

The insight collected here complements the findings from the other two Results chapters that present planning professionals' views regarding the planning processes and conduct of public participation. To reiterate briefly the main findings from planning professionals' responses, client organisations use DPPs for a wide range of objectives, as motivated by engagement strategies and guidance documents. A key aim of transparent and effective engagement projects is to align objectives with realistic levels of influence. Toward this end, DPPs need to be deployed alongside ecosystems of tools, otherwise it is expected that they will not function as effectively. Depending on platform type, planning professionals particularly value the following DPP features: i) back-end data management and consultation design tool; ii) dialogical functionalities; iii) geoparticipation functionalities; iv) DPPs' usability, scalability and flexibility of use. Under the right use-contexts, DPPs enable to reach more people and collect more diverse views than traditional methods. At the same time, the main opportunities and challenges to the use of DPPs relate to organisational and institutional factors than to technological considerations. Organisational opportunities and challenges revolve around: political support, resources (time, budgets, skills), integration of citizen input and DPPs in intra-organisational workflows and planning decisions. Institutional factors include: attitudes toward participatory processes, digital divides, engagement divides, and trust in local government. The responses from planning professionals also reveal that DPPs' influence can be evaluated both in terms of planning processes and outcomes, and that DPP technology and planning workflows contribute seem to reshape each other over time.

While the responses collected from planning professionals are valuable, the unsystematic sampling approach necessarily features participant self-selection. To gain a broader picture of the way in which DPPs are used in urban planning, software providers were asked about the very same themes as the planning professionals. Importantly, software providers' cumulative insight about different DPP use-cases and client organisations provide general insight about the use of different DPPs for a wider range of client organisations and projects than the sample of use-cases and planning professionals in this thesis. In addition, software providers often have their own views about the ideal conduct of public participation, and how it can inform planning decisions and processes. The latter can reveal interesting insight about the manner in which technology can frame opportunities for public participation, in complement to the planning professionals' own responses.

8.1 Objectives for public participation & perceived influence

In a similar manner as planning professionals, software providers often articulated engagement objectives and DPPs' influence on planning as related. This section presents software providers' views for each engagement category on the IAP2 Spectrum and proceeds with a presentation of relevant socio-technical factors. Besides the use of DPPs for information and communication

purposes, the software providers typically viewed that the DPPs are mostly used to support the middle levels of the IAP2 Spectrum, between “consult” and “collaborate”. Table 12 displays respondents’ main observations of the objectives for public participation and the perceived influence of DPPs on urban planning.

Table 12 - Objectives for public participation mentioned by software providers

Engagement objectives	Determining socio-technical factors	Software providers
Inform	Multifunctional DPPs can provide more information than specialised DPPs, and in turn support higher quality of citizen contributions	Bang the Table US, Commonplace, Stickyworld, Neighborland, Open Source Politics
	Must reach out and adapt to different publics yet not all citizens want to participate	Commonplace, Bästa Platsen, coUrbanize, Cap Collectif, Carticipe
	Many citizens do not seek active participation but benefit from viewing information and other users' interaction on the DPP	coUrbanize
	3D geoparticipation as immersive way of visualizing and learning about design and planning proposals	CityPlanner
Consult	Consultation as main recurring objective across projects (regardless of scale or type)	Maptionnaire, CityPlanner/MinStad
	Geoparticipation often used for consultation purposes, especially if used as stand-alone *survey tool* (i.e. without complementary in-person methods & spatial analysis from software provider)	Carticipe, Bästa Platsen
	Broadens the demographic range of participants in spatially-relevant way	Maptionnaire, Commonplace, coUrbanize, Social Pinpoint
	Can collect mass input from citizens about both their experiences and wishes (*also involvement?*)	Maptionnaire, Commonplace, CityPlanner
Involve	Geoparticipation used as *method* in dialogical planning approach (see below also)	Carticipe, coUrbanize, Commonplace, Maptionnaire
	Greater involvement when DPP deployed in hybrid public participation efforts (street survey mode, in-person geoparticipation results on DPP)	Commonplace, Bästa Platsen, coUrbanize, Carticipe
	DPP is designed for involvement and overall dialogue* between citizens and planners	Bästa Platsen, coUrbanize
	Two-way dialogue requires planners to engage with communities and give personal feedback	coUrbanize
	Rising citizen expectation to be involved through continuous rather than project-bound engagement	Commonplace

Table 12 - Objectives for public participation mentioned by software providers (2/2)

Engagement objectives	Determining socio-technical factors	Software providers
Collaborate	Platform mainly fosters collaboration	Neighborland, Stickyworld
	Open Source DPP model as conducive to collaboration	Citizens Foundation, Open Source Politics
Dependent on client & project	Engagement objectives for using the DPP is largely dependent on the client organisation	All platforms
Empower	Empowerment use-cases as flagship projects	Neighborland
	Open Source DPP model as conducive to empowerment	Neighborland, Citizens Foundation, Open Source Politics
	Participatory budgeting as more conducive to empowerment	Citizens Foundation, Cap Collectif
Not empowerment	Decision-making in local government is governed by a representative local democratic structure and rarely enables empowerment	Bang the Table, CityPlanner, Bästa Platsen, Cap Collectif

8.1.1 Inform

Information was viewed as prerequisite for most software providers. Multifunctional/Generalist platforms and participatory budgeting platforms were often most apt to provide background information about planning processes, although other platforms (e.g. geoparticipation) could also provide some elements of information. Information was often provided alongside the platform itself, as part of an engagement methodology developed by the engagement consultancy (e.g. Spacescape for *Bästa Platsen* & Repérage Urbain for *Carticipe-Debatomap*). The capacity to provide background information was perceived to ameliorate the quality of citizen contributions

Three software providers highlighted the inherent right of citizens *not* to participate in urban planning, despite their own advocacy of participatory planning practices. A respondent viewed that low participation in urban planning was more a matter of engagement divide than digital divide per se:

> [*Interviewer*]: In terms of digital divides and citizen perceptions, how is it with your clients? Is the digital divide a big issue? Are some communities excluded from the whole process of online engagement?
>
> [*Bang the Table - Engagement manager*]: I would not see it as digital divide anymore, and maybe just as engagement divide. If there are populations that have never been connected to the organisation, going online is not suddenly going to connect those populations to the organisation. Likely the reason they were not connected was not that they did not have access to online information. It takes building that relationship and building your own core, explaining to those populations how they can connect, how to make things accessible in the online space.

Seven respondents recognised that the use of DPPs by citizens could take time and require long-term habituation and exposure to DPPs, especially in climates of engagement divides. Five respondents explicitly referred to engagement divides as occurring among people that tend not to participate, and/or among active populations with a low interest or little time to participate in urban affairs or civic issues. Regarding specific DPP features, 3D and 2D geoparticipation were perceived as privileged modes of informing residents about the spatial dimensions of planning for all platforms (*Social Pinpoint*; *Carticipe*; *CityPlanner*; *Commonplace*; *Bästa Platsen*).

8.1.2 Consult

Consultation was perceived as the mainstay of engagement through DPPs. In particular, geoparticipation platforms seemed to promote consultation more than participatory budgeting or multifunctional/generalist platforms. This especially seems to be the case if geoparticipation used as a stand-alone engagement method without the support of significant in-person engagement methods and/or advanced spatial analysis on the part of the software provider (*Bästa Platsen*, *Carticipe*). In the reviewed platforms, geoparticipation is primarily deployed as map-based surveys. As such, they primarily facilitate consultation. Across all interviews with the software providers, DPPs' capacity to collect the views of participants was perceived as facilitating consultation and/or involvement,

depending on perspective. A senior member at *Maptionnaire* viewed that municipalities typically use the tool to consult residents and would seldom venture into higher levels on the Spectrum. This said, the respondent was careful in pigeon-holing the use of the platform to any specific category. Being a researcher as well as consultant, the respondent viewed that one needs to be clear about the definition of objective categories, given the profusion of existing approaches to public participation. The respondent also mentioned that it is not always very clear in practice how category definitions, such as those on the IAP2 Spectrum, would be translated and interpreted by practitioners.

8.1.3 Involve & Collaborate

As the *Involve* and *Collaborate* categories are closely linked and often overlap, they are treated together. Involvement seemed to denote the use of DPPs as methodologies rather than simple tools, especially for geoparticipation platforms. The use of DPPs as part of ecosystems of tools also seemed more likely to foster involvement, if not collaboration. Involvement was more explicit where the DPPs facilitated two-way dialogue between citizens and planners, for example where platforms enabled planners to respond to individual citizen comments. Involvement, like collaboration, could also stretch beyond the duration of a single engagement project, and take place, if not accrue, from one project to the next, or through continuous engagement.

DPPs can explicitly enable collaboration between planners and citizens. Open Source platforms foster collaboration not only in the platform's design, but also in their very non-proprietary distribution mode. The latter is viewed to enable and align with a correspondingly more open model for local democracy and participatory planning (e.g. *Citizens Foundation*, *Decidim*). Compared to planning consultancies, non-profits and social entreprises explicitly advocate a strong ethos for collaboration as well as some form of empowerment in participatory planning (*Citizens Foundation*, *Neighborland*, Open Source Politics). A respondent viewed that the aim of using the platform was mostly to support client organisations in reaching the upper levels on the IAP2 Spectrum:

> [In] the majority of our projects we are reaching 'collaboration' within the Spectrum [*Neighborland senior manager*].

Stickyworld (now Convers) stands out from the other software in that it is designed as a versatile and highly customisable collaboration tool. The interview highlighted that the tool is thereby not narrowly designed as an engagement tool per se. Instead it can facilitate all levels of collaboration, from small teams within an organisation to large-scale public participation. While the interview participant viewed that it is always up to the client organisation to design and use the tool as they see most fit, *Stickyworld* stands out by its technological emphasis on collaboration.

8.1.4 Empowerment

Use-cases that were viewed to foster empowerment typically serve as flagship use cases. Case study summaries of such empowering use-cases are often shared on social media and on the software providers' websites. *Neighborland* stands out in its stance toward empowerment in that the organisation explicitly mobilises the notion of 'empowerment' of local communities in their organisation's very mission statement:

> The empowerment is happening in the projects that we really… that you see that we market, because our mission is to empower people. That is our mission, right? "Empower people to shape their neighbourhoods."
>
> We are trying to find partners like the city of Mesa, like the city of Raleigh, like the city of Atlanta on these projects where we celebrate empowerment. We encourage our partners to empower. That is our mission as a company [*Neighborland senior manager*].

Citizens Foundation explicitly advocates 'empowerment' by way of a technological approach, namely AI (Artificial Intelligence), as advertised on their website[48]:

> Citizens' Foundation has been developing tools for democratic participation and citizens' empowerment built with artificial intelligence.
>
> AI can assist in fighting the filter bubbles and biases to help citizens make informed decisions based on their real needs, empowering them with relevant knowledge
>
> AI notifications can lower the barriers for participation by notifying citizens on relevant issues, assisting citizens to serve their democratic interests online by notifying them about participation opportunities

The interview with *Citizens Foundation* also reinforced the notion of informed participation as a means for citizens to submit higher quality contributions. In turn, higher quality contributions stand a significantly higher chance of impacting planning decisions. The interview also dwelled on the algorithms used by the software that prevent echo chambers (i.e. 'bubbles') that would display content based on participants' preferences. The software also ensures a randomised display of citizen proposals to prevent biased promotion of the most popular ideas on the website.

The interviews seem to reveal two different approaches to 'empowerment'. The first is linked with power delegation in the sense conveyed by the IAP2 Spectrum. The second denotes an enabling participatory process whereby citizens actively share their views and contribute ideas and solutions to planning issues that matter to them. The interviews do not support the notion of power-delegation as a normative goal for participatory planning. Instead, the software providers advocate forms of

[48] Citizens Foundation (2019). Empower Citizens with AI. Retrieved from https://www.citizens.is/empower-citizens-with-ai/ [accessed 26 October 2019]

empowerment that are centred around effective dialogue and agency in planning processes. Perhaps these relate more to 'involvement' and 'collaboration' as described on the IAP2 Spectrum. Interestingly, four software providers mentioned power-delegation either as a *non-objective* or as an unrealistic objective (*Maptionnaire*, *Carticipe*, *Cap Collectif*, *CityPlanner*). This is due to the complex nature of urban planning that requires the coordination of competing interests and rests on the observance of various planning regulations and orientations. Furthermore, existing decision-making procedures in local representative democracy are seldom conducive to a full delegation of power to citizens. A notable exception is the constrained form of shared decision-making exercised via participatory budgeting on typically small percentages of total municipal capital investment (*Citizens Foundation*, *Cap Collectif*, *Decidim*-OPS). Open Source approaches to technology development, distribution and even participatory planning were often portrayed as more empowering than proprietary business models (see also the section "Staff expertise, ethos and activism").

8.1.5 Objectives dependent on client organisation and planning projects

The public participation objectives for using DPPs remain largely dependent on client organisations and planning projects. All software providers viewed that the DPPs enable a wide range of engagement objectives, and that is up to client organisations to design participatory processes and the DPPs as they see most fit. In particular, platforms that provide a back-end customisation tool make this observation even more salient, as opposed to platforms for which customisation normally depends on the software providers (e.g. *Carticipe*, *Bästa Platsen*). The interview with Open Source Politics (OSP) revealed that *Decidim* is an interesting case, because although it is an Open Source software and is in principle freely available to city agencies, it is usually customised by an expert consultancy such as OSP. Regardless of the mode of DPP customisation, the participatory process itself remains the preserve of city agencies. The use of DPPs is therefore not determined by any intrinsic engagement objective. As DPPs are a means to an end rather than an end in themselves, the wider engagement strategy will frame the objectives for their use, as articulated through the design of specific DPP applications. Although necessarily valued and promoted by software providers, DPPs were never portrayed as a silver bullet to effective public participation. Furthermore, the respondents at *Neighborland*, *Bang the Table*, *Social Pinpoint* and *Carticipe* all mentioned city agencies which they perceived as exemplary in the way they used DPPs to conduct public participation, including a

clear communication of engagement objectives to the public[49]. Besides the cases investigated here, they also pointed to other exemplar cases that could provide inspiration for best practice.

8.1.6 Levels of influence are project-dependent

Across all the interviews, the overall level of the DPP's influence on planning seems next to impossible to determine because largely project-dependent and hinging on a wide range of determining factors. A key determinant is the level of determination for planning organisations to engage the public. Planning organisations that simply want to tick the box of public participation by adopting DPPs were not seen as likely to generate effective and impactful participation. Related to the latter, appropriate design of the DPP application by platform administrators (i.e. for DPPs with a back-end design interface) and the presence of a clear engagement strategy were perceived to be highly project dependent rather than being intrinsic to the DPP. Effective promotion and awareness raising about the platform through all available communication channels, including social media campaigns, was seen as a key prerequisite for effective online engagement. The deployment of DPPs earlier in planning processes is more likely to influence planning as a whole, in particular for geoparticipation platforms. Once collected, the views of citizens require adequate processing, which requires sufficient capacity in the form of material and human resources. Likewise, the capacity to provide feedback about how the citizen input has been processed and used by the planning organisation enables to maintain trust and transparency between planning agencies and citizens, both for the duration of the engagement project, and in the long-term (i.e. beyond project completion).

All DPPs can facilitate a wide range of engagement purposes and desired levels of influence, and potentially support all stages of a planning process, from pre-planning baseline data collection to post-engagement evaluation, or even recursive/retrospective feedback collection from citizens about the use of DPP itself. At the same time, multifunctional/generalist DPPs have the potential to cater for the widest spectrum of engagement purposes and levels of influence, due to the wider range of tools and functionalities which they provide to client organisations. Indeed, several respondents portrayed multifunctional DPPs as ecosystems of tools or toolboxes that can be customised by clients at will.

8.2 Socio-technical factors determining the use and influence of DPPs

[49] Noteworthy cases mentioned by software providers included: the city of Longmont (Colorado) for its adaptation of the IAP2 Spectrum; the city of Bunbury for its high level of public participation; the cities of Mesa and Atlanta (Turner field); the city of Barcelona for its ambitious engagement efforts and the development of Decidim; the cities of Bordeaux, Nantes, and Angers in France for their successful engagement efforts and/or a tradition of public participation. *Note: this is not an exhaustive list.*

This section presents the main socio-technical factors that influence the use of DPPs in urban planning, from the perspective of software providers. These factors also cover functionalities and avenues for future technological development. Table 13 (in 5 parts) provides an overview of software providers' responses.

Table 13 - Overview of themes that determine the use and influence of DPPs on urban planning, as mentioned by software providers (1/5)

Themes (1)	Determining socio-technical factors	Software providers
Level of influence is project dependent	Determination to engage will largely determine levels of influence (applies beyond single projects)	All software providers
	Appropriate design of the DPP application as part of coherent/clear engagement strategy	Most software providers
	Effective promotion of DPP through all channels (e.g. social media, local newspaper, signs in street, flyers, postcards)	All software providers
	Organisations' capacity to process, use and give feedback about citizen input (which is related to the planning stage at which DPP is used)	Stickyworld, Commonplace, Bang the Table, Maptionnaire
	Influence of DPP higher when deployed earlier in planning processes, e.g. especially for geoparticipation	Carticipe, Bästa Platsen, Maptionnaire, CityPlanner
Level of influence can be DPP dependent	Multifunctional DPPs feature a wider spectrum of tools that can facilitate different levels of influence	Bang the Table

Table 13 - Overview of themes that determine the use and influence of DPPs on urban planning, as mentioned by software providers (2/5)

Themes (2)	Determining socio-technical factors	Software providers
Workflows and processes	Exponential increase in DPP adoption by planning agencies over the past 5 years, and related growth in Civic Tech market	Most software providers
	"Influence" should also consider changing workflows and processes in planning as both *result* and *condition* of use of DPP	Maptionnaire, Stickyworld, CityPlanner
	Both processes and outcomes need to be considered, as final decisions are only the "top of the iceberg" of influence	Maptionnaire, coUrbanize
	Use of DPP input across multiple projects	Maptionnaire
	Cost of collecting and processing each citizen contribution lower than for other methods; economies of scale	Most software providers
	Most hurdles to the influence of DPPs on planning decisions are linked to public participation and digital engagement in general	Social Pinpoint, Cap Collectif, Carticipe
Breadth & depth of engagement	DPP enables structured engagement on mass scale, beyond statistically representative samples	Commonplace, Neighborland
	Greater breadth and depth of engagement through integration of in-person methods with DPP	Carticipe
	Breadth of engagement dependent on type and scale of project	Social Pinpoint
	Breadth of engagement relates to proportion of resident population rather than absolute number of participants	Social Pinpoint, Neighborland, Commonplace
	Engagement & digital divides can limit participation and inclusion in some areas more than others	Bästa Platsen, Carticipe, Neighborland, Bang the Table

Table 13 - Overview of themes that determine the use and influence of DPPs on urban planning, as mentioned by software providers (3/5)

Themes (3)	Determining socio-technical factors	Software providers
Engagement design	DPP should not be used for its own sake, but to support planning processes	Carticipe, Cap Collectif
	Number of projects on DPP can differ across planning organisations	Bang the Table, Cap Collectif
	Time spent by citizens on DPPs is low (e.g. 5 minutes), which requires effective design of engagement	Bang the Table, Cap Collectif
	Existence of clear PP methodology aligns design, conduct and evaluation in systematic/coherent way	Bang the Table, Neighborland
	Software provider supports clients with design of engagement process	Nearly all software providers
DPP adoption	Fear of engaging citizens overcome by relatively low need for moderation of citizen comments	Cap Collectif, Bang the Table
	Planning organisations with a culture of engagement more likely to adopt DPPs	Nearly all software providers
	Adoption of DPP & participatory planning in local government in response to national/international politics & societal dynamics	Cap Collectif, Bang the Table, Neighborland, itizens Foundation, Open Source Politics
	Municipalities in suburban and rural locations less likely to adopt DPPs and innovative PP methods	Carticipe, coUrbanize
	The primacy of written comments and traditional methods may limit adoption and/or use of DPPs	Social Pinpoint, Carticipe, Cap Collectif, coUrbanize

Table 13 - Overview of themes that determine the use and influence of DPPs on urban planning, as mentioned by software providers (4/5)

Themes (4)	Determining socio-technical factors	Software providers
DPP flexibility & scalability	Versatile collaboration platforms vs. bespoke engagement platforms	E.g. Stickyworld & CityPlanner vs. other DPPs
	Multifunctional platforms as tool ecosystems or toolboxes	All generalist & multifunctional platforms
	Geoparticipation & multifunctional platforms are scalable as per geography and planning theme	All geoparticipation & multifunctional platforms
User experience & accessibility	Iterative user-centred development resulting from cumulative project experience & evolving client needs	All software providers
	Interdependencies b/w accessibility, usability & user experience for platform administrators & end-users	Nearly all software providers
	Accessibility to DPP as a requisite for greater inclusion	Neighborland, Open Source Politics
	Mobile-friendly applications lower the barrier for participation, but can also restrict depth of engagement	Citizens Foundation, CityPlanner

Table 13 - Overview of themes that determine the use and influence of DPPs on urban planning, as mentioned by software providers (5/5)

Themes (5)	Determining socio-technical factors	Software providers
DPP upgrades & technological development	Easier data analysis & manipulation for improved workflow integrations, especially on the back-end tools	Most software providers
	Planned development toward multifunctional DPP to enable wider range of objectives, including greater involvement and more information	Bästa Platsen
	Open Source and mutualised development model makes product upgrades available to all clients simultaneously	Citizens Foundation, Cap Collectif Open Source Politics,
Staff expertise & ethos	Staff at software companies fostering, advocating and/or championing participatory planning	Nearly all software providers
	Community engagement in local government is increasingly conducted by experts, differentiated from communications officers	Bang the Table
	Staff ethos about participatory planning & collaboration as shaping DPP design and/or engagement methodology	All software providers
	Engagement consultancies can have more developed engagement methodologies than providers that only supply a software	e.g. Carticipe, Bästa Platsen & Neighborland vs. other DPPs

8.2.1 Planning workflows & processes

Beyond single engagement projects, the determination to engage the public was the single most important factor behind the adoption and effective use of DPPs in planning. Planning agencies with a historical tradition of engaging citizens and/or displaying a marked openness toward effective public engagement were more likely to engage effectively. Linked to the latter, once software providers had succeeded in building a trustworthy reputation, if not in actually *creating* a national market for digital engagement (e.g. *Commonplace* in the UK; *Cap Collectif* in France; *Citizens Foundation* in Iceland), client organisation were more likely to initiate contact regarding potential procurement opportunities, rather than the other way around. Some software providers expressed a marked preference and/or exclusive choice to work with engagement-minded clients, rather than try to convince dubious planning agencies about the merits of DPPs (e.g. *Carticipe*, *Cap Collectif*).

A key finding is that software providers emphasised both processes *and* planning outcomes when assessing the influence of DPPs on planning. A respondent at *Maptionnaire* indicated that planning decisions are only the "top of the iceberg" of planning processes. This has important implications for how influence is evaluated. Engagement processes can facilitate a range of planned and unaccounted engagement objectives, such as greater awareness-raising about planning in general, beyond the duration of individual projects. Therefore, the effectiveness of engagement as a process needs equal or commensurate consideration. This requires attending to the multiple determinants of such effectiveness, such as: demographic inclusion, breadth and depth of engagement, and levels of trust between planning agencies and the public. These multiple determinants of effectiveness can be simultaneously project dependent, contextually entrenched, dynamic over time, and geographically distributed within cities. Therefore, a comprehensive assessment of DPPs' influence is inherently complex. All software providers grant special value to quantitative metrics of public participation as a basis for effective benchmarks and practical recommendations for clients. At the same time, they also stress the need for holistic qualitative assessments over time that stretch well beyond the evaluation of individual engagement projects, as further highlighted in the sections below.

A related finding is that hurdles to DPP adoption and effective use affect public participation in general. This is linked to planning organisations' determination to engage the public. The wilful choice to engage the public translates as political and staff attitudes toward public participation and collaborative workflows and the corresponding need for adequate capacity, in the form of digital and in-person engagement skills, staff availability, engagement materials/equipment (both digital and physical) and financial resources, which can be supplied internally and/or procured to consultancies. Flagship projects highlighted by software providers in their external communication (e.g. on their company's website and social media) typically make innovative use of a wide range of materials and engagement approaches that build on adequate capacity and collaborative workflows both internally

and with various stakeholder groups, underpinned by a keen willingness to engage diverse publics. The added value of DPPs in terms of upscaling of participation, structuring of participation, and facilitated processing of citizen input are also portrayed as more cost-effective than for most other methods, in particular in-person engagement methods. Some respondents sometimes articulated this cost-effectiveness as a lower transaction cost per citizen contribution.

Related to the fact that engagement objectives depend on projects and client organisations, all software providers indicated that councils display varying levels of capacity and/or willingness to engage the public. For instance, in comparison to the successful use of *Decidim* at Lille metro for several consultations, the respondent at Open Source Politics viewed that not all local councils are equally eager to engage:

> Not all agencies go as high up on the scale of public participation.

Software mentioned that citizens' views do not necessarily coincide with planners' and/or decision makers' own views. Respondents indicated that taking stock of citizen input may require openness and commitment on the part of local authorities, for example a willingness to conduct two-way dialogue (*Cap Collectif, Carticipe, Neighborland, CityPlanner, Commonplace, coUrbanize,* Open Source Politics). This could entail leveraging some degree of involvement, collaboration and/or empowerment of sorts. Where citizen input is not fully accounted for in planning outcomes, this should be stated explicitly in the form of feedback to the public, ideally continuously throughout the planning process as well as post-hoc. The capacity to provide continuous rather than ad-hoc or post-hoc feedback was sometimes mentioned as supporting more effective and transparent planning. An increasing number of planning organisations now seek to provide continuous engagement opportunities to the public, compared to even just five years ago (e.g. *Commonplace, Cap Collectif, Decidim*-OSP).

The use of citizen input on the DPPs across multiple projects was sometimes highlighted as both requiring *and* fostering collaborative workflows among staff at the planning agencies. In particular, multifunctional DPPs provide an elaborate back-end interface for collaboration among staff (e.g. *Neighborland, Stickyworld, Bang the Table, Cap Collectif*). Software providers also highlighted integration in planning workflows through the export of data files via different formats. For example, shapefiles can be exported into GIS software in the case of geoparticipation platforms, which in turn enables the use of citizen input across multiple planning projects, with some municipalities leading the way in this regard.

While most software providers support planning organisations with best practice recommendations, most software providers admitted having mostly indirect relationships with actual end-users (i.e. citizens/residents), with the exception of software providers who also conducted boots-on-the-ground

engagement (e.g. Repérage Urbain for *Carticipe* and Spacescape for *Bästa Platsen*). In this regard, consideration of end-user views about the DPPs would only be gathered via planning organisations rather than software providers. The only direct contact which some software providers sometimes had with citizens/residents was when the latter would experience technical difficulties and share negative feedback about the DPP's design.

8.2.2 DPP adoption & attitudes toward DPPs

Software providers provided valuable insight about the different factors that affect planning organisations' adoption of DPPs, as expressed by their clients. Software providers noted that first-time adopters of DPP were sometimes apprehensive about potential abusive appropriations of online fora by citizens, for example to express aggressive views or submit irrelevant content (i.e. 'spam'). In practice, DPPs feature a moderate if not insignificant numbers of such citizen contributions. Various checks are often in place to detect abusive language (e.g. 'toxicity' analyses of comments), particularly on multifunctional/generalist DPPs. In this respect, DPPs differ from common types of online fora and social media where all kinds of comments can be freely published without structured or automatised moderation. Despite generally low needs for moderation, staff at planning agencies may still need to allocate sufficient resources to monitor activity on the DPPs (*Bang the Table*, *Cap Collectif*, *Commonplace*, Open Source Politics, *Neighborland*, *Citizens Foundation*).

Adoption factors can be both organisational and institutional. Respondent repeatedly mentioned a growing general acceptance of DPPs in society. This is paralleled with the will among local councils to foster greater transparency and continuous engagement in planning processes in local councils, while retaining control over how these are deployed:

> There is less resistance to the idea of transparency. There is much less resistance to the idea of continuous engagement. Those two things which were more fringe, young-people stuff 5 years ago, are now mainstream[50]. Because of people's experience in lots of other areas of life. And because that kind of experience of "always on" has moved from the young and tech-savvy to everybody in society because of the way even things like Universal Credit work. So, increasingly we are pushed to digital platforms. Digital platforms are not only based on the immediate exchange you carry out, but they also then have add-ons of continuous information and update. So, I think that has changed radically. What has not changed is the fact that clients want to manage their communications in order to achieve the least damage or the best impact in terms of timing and content [*Commonplace senior manager*].

Software providers also repeatedly acknowledged the interplay between public trust and DPP acceptance among planning organisations, and that both build over time rather than overnight.

[50] *Note*: the interview was conducted in October 2018 and the insight shared by the respondent might be time-sensitive.

Engagement-minded planning organisations and municipalities located in urban cores are more likely to adopt DPPs, as opposed to more suburban or rural municipalities that may be less acquainted with digital forms of engagement or favour more traditional modes of engagement. Even in larger city agencies, some planners and decision-makers may still favour and accord greater weight to written comments and contributions submitted at in-person events than to contributions on a DPP. There may be related expectations that an informed citizen requires significant amounts of background information before being able to submit valuable contributions. In particular, the fact that citizen participation on DPPs may be very short (e.g. only a few minutes) compared to in-person methods is sometimes mobilised by planning staff and decision-makers as discrediting their purported value. The quality and representativeness of online contributions may remain subject to greater scrutiny and criticism on the part of local authorities, which may in turn affect DPPs' influence on planning. Hurdles to DPP adoption may concern the capacity to adopt comprehensive engagement approaches as a whole, rather DPPs per se. For instance:

> I think those [clients] we have covered in the last 2 ½ years would say that most of the times their obstacles are to comprehensive community engagement. So online becomes a component of that. But typically there is either a culture of engagement or there are barriers to engagement, and these are really pretty comprehensive whether it is in-person or online [*Bang the Table USA engagement manager*].

Furthermore, two software providers expressed that because decision-makers and senior planners tend to be older, they may also be less proficient with digital technologies and less trusting of DPPs' added value in participatory planning. They also repeatedly observed distrust from planning professionals who consider their expertise as superior to citizens' own local knowledge.

Notwithstanding attitudinal hindrances to DPP adoption, many planning organisations are keen to adopt and experiment with DPPs even when lacking any experience in digital engagement. Technical support and recommendations from software providers with the cumulative experience of DPP applications are often key in winning over potential first-time DPP adopters. Such support can be provided directly as a consultancy service, online resources (e.g. handbooks, videos, case-study summaries), online training and informational events (e.g. webinars) or blog posts on the company's websites.

8.2.3 Breadth & depth of engagement

The breadth and depth of engagement were often mentioned by software providers as two important components of the use of DPPs. Breadth of engagement relates to dimensions that pertain to socio-demographic inclusion and representativeness, such as: age, gender, physical ability, ethnicity-race, linguistic competency, digital literacy, planning and civic literacy, socio-economic status, and location of residence, which can be correlated with particular propensities to engage in urban and civic affairs. Baseline demographic data about a city's population helps determine the actual representativeness of

participation on the DPP, for projects where sufficient demographic data about participants can be obtained through both direct (e.g. registration-based participation) and indirect means (e.g. browser & website analytics, light weight verifications, inferences). The breadth of engagement was seen as highly dependent on the planning project's type and scale and corresponding engagement purposes. Typically, software providers mentioned the need and challenge of engaging the following hard-to-reach groups: young people, children and youth, older people, people with limited mobility, ethnic minorities, and residents in deprived areas. Hard-to-reach groups may face compound obstacles to public participation. Flagship projects were often creative and innovative in engaging a broad diversity of both people and perspectives. Some respondents recommended a mixed mode surveying approach to engagement, where the DPPs would facilitate large scale dialogue and engagement rather than statistical representativeness (e.g. *Commonplace*, *Neighborland*). Several respondents warned against focusing on metrics of participation alone (e.g. number of participants, number of comments or ideas submitted), although these are essential for benchmarking participation both within individual cities and across different cities.

DPP were typically portrayed as enabling mass participation, in contrast to other methods. Some respondents highlighted that DPPs provided a medium to scale up participation when compared to most in-person methods or statistically representative citizen surveys, while enabling to directly utilise and analyse such mass citizen input in a structured way. Planning organisations would be hard pressed to parse and extract meaning from unstructured conversations across different social media, which would be costly. Beyond inclusion, the DPPs were also portrayed as mediating[51] varying depths of engagement. Depth pertains to the type and level of participation, ranging from simple and quick functionalities (e.g. citizen endorsements modelled on social media "liking" features) to more labour-intensive and time-consuming activities such as providing feedback on specific design proposals or scenarios through various tools (e.g. text and map-based survey, commenting, argumentation, ranking scenarios). Focusing on breadth (i.e. numbers of participants) at the expense of the depth or quality of engagement may jeopardise the credibility of digital participation.

Interestingly, different depths of engagement can be distributed and coordinated across digital and in-person engagement methods as part of wider ecosystems of tools and coherent engagement strategies. Several flagship engagement projects highlighted by software providers made innovative use of multiple methods to provide varying levels of depth of engagement, for example through multiple

[51] The term 'mediating' is used here in the objective, technological sense of the word, as a functional medium, rather than its brokerage/facilitation connotation that is specific to contexts of conflict mediation between opposing parties.

tools on the DPPs (especially on multifunctional DPPs), complementary in-person methods (e.g. co-design workshops; pop-up engagement stalls in public space) and digital methods (e.g. social media use for deliberation and awareness-raising). Both the breadth and depth of engagement relate to other dimensions presented here, such as DPP accessibility, usability and user experience, engagement design, DPP flexibility and scalability, and individual engagement objectives.

8.2.4 User experience and accessibility

Usability and accessibility are key to broadening engagement. Mirroring the increasing adoption of DPPs by planning agencies since 2014-2015, all software providers mentioned a concurrent growth in the penetration of smartphone and digital tablet technologies in society, and a corresponding requirement to make platforms mobile-friendly. A cave-at concerns mobile digital devices, as these entail a necessary trade-off between enabling more flexible and broader access to DPPs on the one hand, and the quality of citizen contributions submitted via these devices on the other, due to more limited functionalities and smaller screens compared to laptops and desktops. Some platform providers were sceptical of compromising the depth of engagement in favour of increasing absolute volumes of participation, for example of using functionalities inspired by social media (e.g. "likes" or endorsements) in the absence of informed argumentation functionalities that would require participants to reflect before submitting views and ideas. At the same time, given the technical nature of planning and the entrenchment of engagement divides, several respondents also stressed the need to make public participation accessible and interesting for, if not "fun". Some individual DPP applications have targeted greater accessibility for specific target groups such as older people (e.g. *Maptionnaire*), the visually impaired (e.g. *Maptionnaire*) or to enable speech-directed participation (e.g. *Citizens Foundation*). In order to broaden the accessibility of the platform and the breadth of engagement, some DPPs were available in multiple languages. For example, *Citizens Foundation* incorporated a Google Translate-based functionality for 20 languages to enable foreign residents and visitors to participate in Better Reykjavik. All platforms seem to undergo continuous improvements through iterative user-centred development. From the perspective of planning organisations, usability and user experience issues concern both the participatory front-end for citizens, and the back-end design and data management tool for platform administrators. A respondent at *Bang the Table* shared that clients were particularly appreciative of the back-end collaboration and data management tool. DPP design therefore requires all-round usability and attractive user-experience, which need to take stock of continuous evolutions in internet and digital device technologies.

8.2.5 DPP flexibility & scalability

Multifunctional/generalist platforms tend to be more flexible and saleable than other platforms due to their wider range of tools, and can accompany the full life cycle of planning projects. Geoparticipation platforms can also be adapted to all geographical scales, from the local block to the metropolitan

region. At least theoretically, geoparticipation platforms can also be applied at all planning stages. Multifunctional DPPs that lack geoparticipation functionalities may be less flexible as they are less able to account for the spatial component of planning projects. *Stickyworld* differs somewhat from other platform in that it is not designed as an engagement platform, but rather as a collaboration platform that can be used for any suite of engagement purposes and activities, from micro publics and internal working groups to large-scale public participation. Multifunctional DPPs and participatory budgeting DPPs are more flexible in their capacity to interlink digital engagement opportunities with in-person events, for example through 'updates' tabs and newsletter subscription functionalities (e.g. *Bang the Table*, *Neighborland*, *Decidim*, *coUrbanize*, *Commonplace*). Integration of in-person and digital engagement can also be conducted by platform administrators themselves (e.g. *Carticipe-Debatomap*). While all-purpose multifunctional DPPs tend to be more flexible, bespoke platforms can be more robust, complete and scaleable in their specific area of application (e.g. participatory budgeting; advanced geoparticipation platforms). Some platforms initially renowned for their strong geoparticipation component have progressively grown into more generalist platforms (e.g. *Commonplace*, *Social Pinpoint*). Some generalist platforms are not venturing into new arenas such as geoparticipation (e.g. *Cap Collectif*), while other generalist platforms have added basic geoparticipation functionalities as part of their suite of tools (e.g. *Decidim*, *Bang the Table*).

8.2.6 Engagement design

Beyond specific engagement objectives, software providers stressed the importance of the design of the overall engagement. In particular, four software providers warned against the risk of adopting DPPs for their own sake and "tick the box" of public participation innovation, rather than for supporting effective participatory planning. On multifunctional DPPs, the number of projects hosted on the platform can differ across client organisations, with some organisations being more selective about which planning projects would benefit from digital engagement. Appropriate and concise engagement design was often regarded as important with due consideration to the average time spent by citizens on DPPs. Based on cumulative project experience and related analytics of participation, a respondent at *Cap Collectif* shared that citizens on average tend to spend five minutes participating on the DPP. This insight echoes with other software providers' mention that active citizens would spend more time in providing many contributions, while other citizens may only view other citizens' contributions on the platform without submitting any contribution of their own. A clear engagement strategy enables to align the design, conduct and evaluation of all engagement methods in a systematic and structured way, even where the DPP serves as the core engagement method. Four software providers stressed the importance of conducting identical or similar structured surveys on DPPs and through other channels (e.g. mail, email and face-to-face surveys), which a respondent at *Bang the Table* called "mirroring". Such systematic design enables valid comparison of data input

across different modes of data collection so as to guide planning decisions in a coherent way. Software providers often provide extensive support, resources, and recommendations for the design of effective engagement.

8.2.7 Ecosystems of tools

Nearly all software providers stress the importance of 'ecosystems' of tools, even where the DPPs themselves can function as tool ecosystems or toolboxes (e.g. multifunctional/generalist platforms). In particular, DPPs are never portrayed as capable of replacing in-person engagement methods or other digital means of engagement (e.g. social media). Rather, software providers prescribe arrays of digital and in-person tools to enable both breadth and depth of engagement (see the corresponding section), even where DPPs provide the main channel for public participation. Some software providers explicitly encourage and facilitate dual, synergetic use of in-person and digital methods; in-person events may be advertised on the DPP, content on the DPP may contribute to shape or inform in-person events, and citizen input from in-person events may in turn be uploaded on the DPP itself (cf. *coUrbanize*, *Commonplace*, *Bang the Table*, *Neighborland*, *Carticipe*, *Bästa Platsen*, *Decidim*-OSP). Therefore, ecosystems of tools are best deployed iteratively, or even recursively.

8.2.8 From tools to methodologies

Engagement and/or planning consultancies can have more developed engagement methodologies than providers who only leverage a software. Two respondents viewed that the most value could be drawn from the DPP if combined with their own expertise of leveraging "boots on the ground" engagement services and spatial analyses of the citizen input (*Carticipe-Debatomap*, *Bästa Platsen*). Alternatively, in cases where this was impractical (e.g. due to geographical distance, low familiarity with the local context, or clients' preference to conduct the engagement activities themselves), the in-person engagement could also be leveraged with similar results by local community engagement consultations with a similar ethos and range of expertise. A respondent for the geoparticipation platform *Carticipe-Debatomap* viewed that the use value of the platform would be less pronounced or obvious if procured as a standalone tool. This related to an important distinction between the use of DPP as a *tool*, as opposed to a *method* or methodology:

> The more *Carticipe* gets used, the more people talk about it as a tool, and the more we develop the methodological dimension behind the use of the tool. So what I usually say during engagement activities and the like, is no longer to talk about a tool, but about a method. […] We have removed the term 'tool' from our engagement material and approach [..] We no longer want to be identified as such. We are apostles of what we call the 'phygital' [sic], which blends both digital and physical/in-person methods, which amount to methodologies that aim to broaden participation and generate results. Building on the premise that we are a process, we aren't a tool for continuous engagement; we have no intention of becoming one [*Carticipe senior manager*].

Additionally, *Carticipe* enables to centralise all in-person and online engagement on the same map-based surveys, which served to fulfil transparency requirements for public participation, and functioned as a tool to support the production of quick analytical reports. Likewise, the use of *Maptionnaire* has been repeatedly portrayed as a method for bridging citizen and expert knowledge, with a view to support a new paradigm of participatory planning. Software providers can also aim to support various stages and/or the full life cycle of planning projects (e.g. *Commonplace*, *Neighborland, coUrbanize*, *Maptionnaire*, *coUrbanize*), while other providers find identify greater value in supporting time-bound engagement activities (e.g. *Carticipe-Debatomap*). At heart, DPP functionalities also convey or facilitate opportunities for elaborate engagement methodologies, particularly when enabling synergies between in-person and DPP engagement in various ways.

8.2.9 Staff expertise, ethos and activism

Staff at software providers typically foster, advocate and/or actively champion the use of DPPs in participatory planning. Open Source DPP technologists appear as the most activist in terms of promoting easier, less commodified access to technology for local authorities, and to democratise engagement opportunities for as many people as possible (e.g. *Decidim*-OSP, *Citizens Foundation*, *Neighborland*). Software providers that also function as engagement and/or planning consultancies typically prescribe the use of DPPs as a service package. In some use-cases, software providers actively participate and support municipalities in deploying the DPPs (e.g. *Neighborland* in Raleigh). Some software providers began as advocacy platforms for collaborative national policy-making, which still remains a part of their activity (e.g. *Cap Collectif*, *Citizens Foundation*). More generally, the technological design and architecture of DPPs seems largely framed by software providers' own ethos and conceptions of effective digital engagement. At planning organisations, an increasing number of staff conducting engagement are specifically hired for the purpose of conducting public participation projects, as differentiated from the technical roles of planning experts or that of communications officers. In conjunction with a growing political will to engage digitally, staff ethos and commitment to experiment with and leverage participatory planning practices contributes to shape the design of DPP applications and engagement methodologies.

8.2.10 DPP upgrades & development

Software providers noted that the main targeted DPP upgrades in the past few years and in the short-term future, concern improvements to the back-end data management and analysis interface, so as to further optimise existing workflow integrations. Common product upgrades mentioned include push-button reporting, sentiment analysis of comments, easy citizen input queries, simple data exports, and collaboration opportunities with third party service providers for workflow integrations. In contexts such as the US, where community engagement is often procured to planning consultancies, workflow integrations that optimise efficient data management are paramount. Likewise, a large number of DPP

clients in the US are developers who have shorter project delivery timescales than municipalities normally do (e.g. *coUrbanize*). Despite the growing popularity of Virtual Reality and Augmented Reality in the mass media and their potential for growth in the consumer technology market, software providers were less interested in venturing into these technologies, or sometimes even geoparticipation, then in further strengthening workflow integrations at planning organisations (*Neighborland*, *Cap Collectif*, *Citizens Foundation*, *CityPlanner*, *Carticipe*). Likewise, 3D geoparticipation was not envisaged by any software provider, in which *CityPlanner* specialises, though seemingly unbeknownst to most of the other interviewed software providers. Interestingly, the respondent at *CityPlanner* also expressed the need to further consolidate data integration in existing planning workflows instead of further extending the horizon of 3D geoparticipation functionalities. On the end-user side, upgrades have concerned the ability to share content published the DPP through different social media, and the capacity for end users to log in via multiple means, including their personal Facebook accounts. A respondent at *Citizens Foundation* mentioned opportunities to develop an Artificial Intelligence based assistant that would help citizens in formulating their proposals, which could in turn empower citizens to make higher quality contributions to participatory planning. In terms of process and business models, Open Source DPPs and non-profits are keener to adopt an open source model to technology development. Platforms such as *Decidim* and *Citizens Foundation* not only adopt but also advocate an Open Source approach to DPP innovation and/or participatory local democracy (see the section "Staff expertise and ethos"). Some proprietary software (e.g. *Cap Collectif*) also mutualise product upgrades commissioned by individual client organisations to their entire client base.

8.2.11 Summary

The interviews with thirteen software providers provided valuable insight about the use of DPPs. This includes the use of DPPs for the reviewed use-cases, as well as the cumulative insight acquired by interviewed the staff at the software companies concerning a much wider range of projects. The chapter highlights a number of key finding. Most importantly, engagement objectives and levels of influence are not intrinsic to DPPs. Planning organisations are largely responsible for framing public participation as most relevant per planning project and planning stage for which engagement is conducted. This said, DPPs seem to facilitate the middle levels of engagement on the IAP2 Spectrum, from 'consult' to 'collaborate'. Software providers also identify opportunities for empowerment in terms of DPPs' capacity to produce high quality citizen contributions and leverage two-way dialogue. Both the design of the DPP application and the overall engagement strategy, including appropriate awareness raising through multiple channels, are perceived as key determinants of the effectiveness of DPPs. Although software providers target and/or advocate higher levels of engagement, DPPs themselves do not mediate any intrinsic objective for participation. DPP acceptance and use seems

more likely to grow overtime as underpinned by planning organisations' capacity and willingness to engage comprehensively.

DPPs are also most effective when used in conjunction with arrays of in-person and other engagement and communication tools, typically as part of ecosystems of tools. Interestingly, multifunctional/generalist platforms can be conceived of as micro-ecosystems of tools. Furthermore, DPPs are best deployed when conceived as elaborate engagement methodologies rather than isolated tools, with a view to optimise both depth and breadth of engagement and facilitate synergies between and coordination across in-person and digital methods. The future development of DPPs, across all platform types, primarily concern improved workflow integrations, especially improved collaboration, data analysis and data management functionalities to optimise the use of citizen input in planning processes. Underpinning all these different components, the expertise, ethos and/or activism of both software providers and planning and engagement professionals is another key determinant for DPP innovation in urban planning. Finally, the main DPP product upgrades across all platform types primarily related to improved workflows integrations, rather than extending DPP functionalities to new technological horizons such as Augmented Reality, Virtual Reality or 3D modelling. In particular, software providers mentioned opportunities to improve or create back-end data management and/or design tools.

The thesis now turns to the Discussion chapter that ties findings back to the literature and proposes avenues for a theory of DPP hybridity.

9 General summary to all Results Chapters

9.1 Diagrammatic summary of the main findings

Figures 38-40 provide a synoptic overview of all the main findings for the thesis, as presented above. The diagrams distil the main findings presented in the Results chapters 6-8. To these, one can further add the fourfold heuristic categorisation of DPPs (Figure 41).

Figure 37 - Summary of main findings regarding responses from urban planning professionals (1/2)

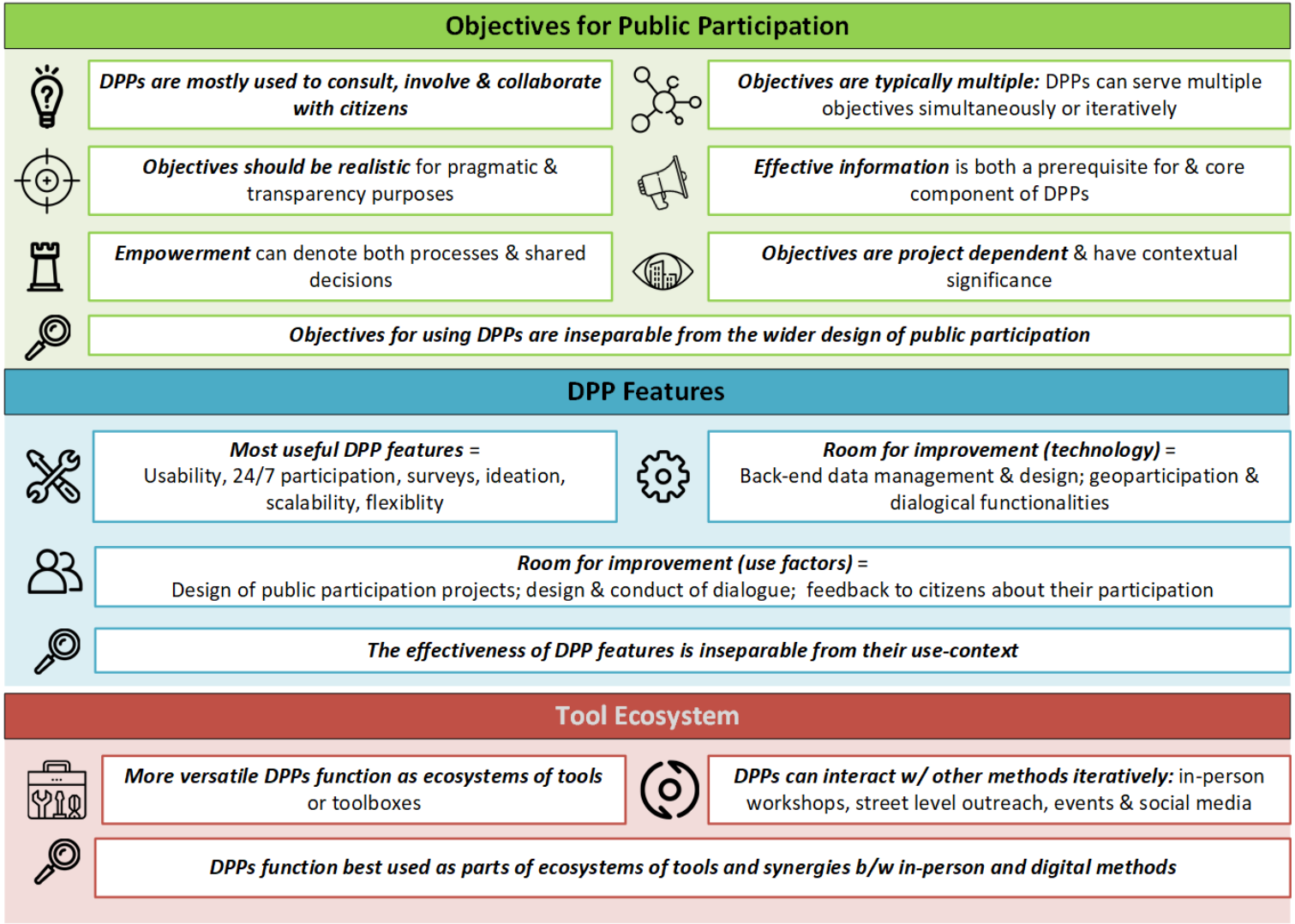


Figure 38 - Summary of main findings regarding responses from urban planning professionals (2/2)

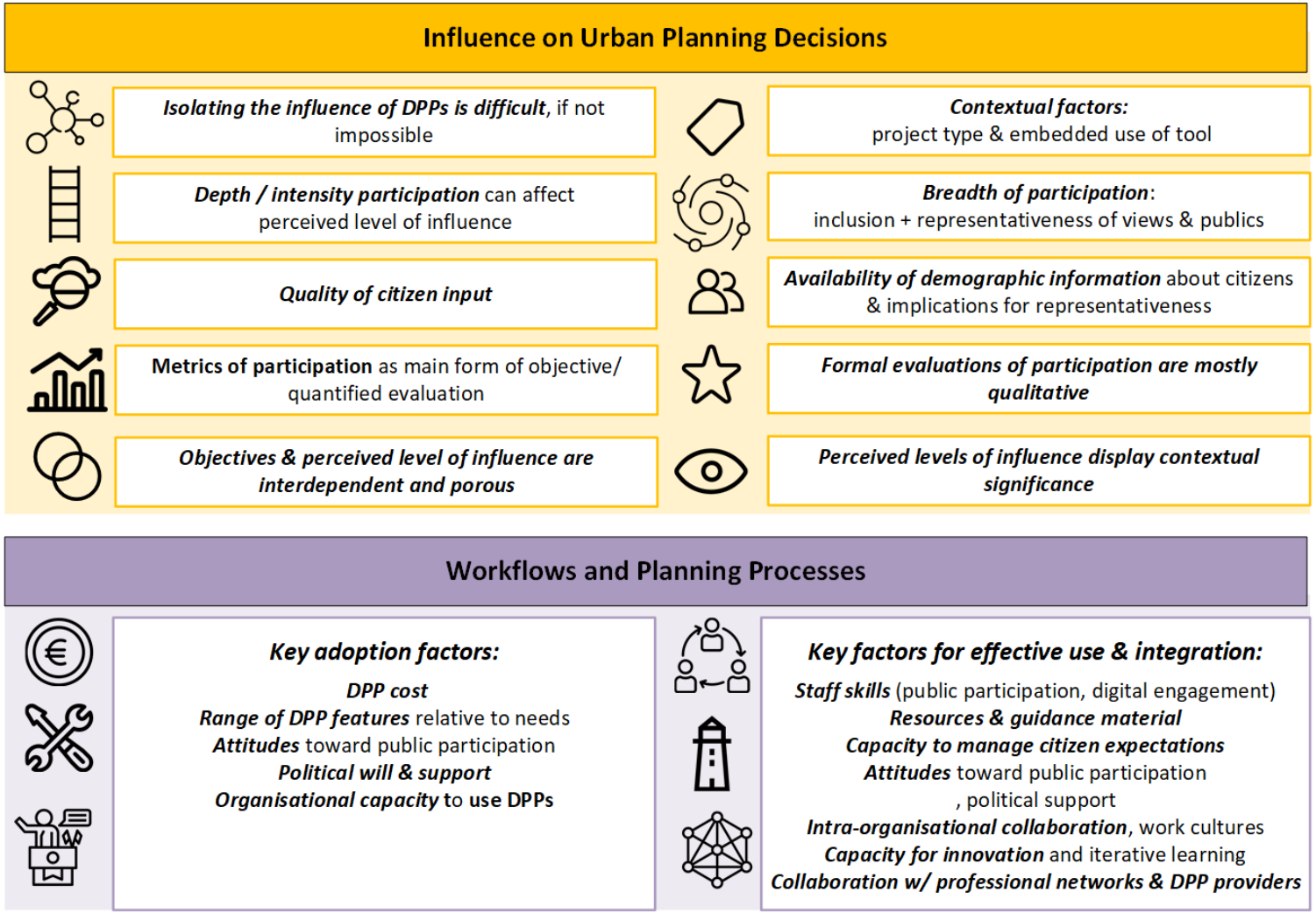


Figure 39 - Summary of main findings regarding responses from software providers

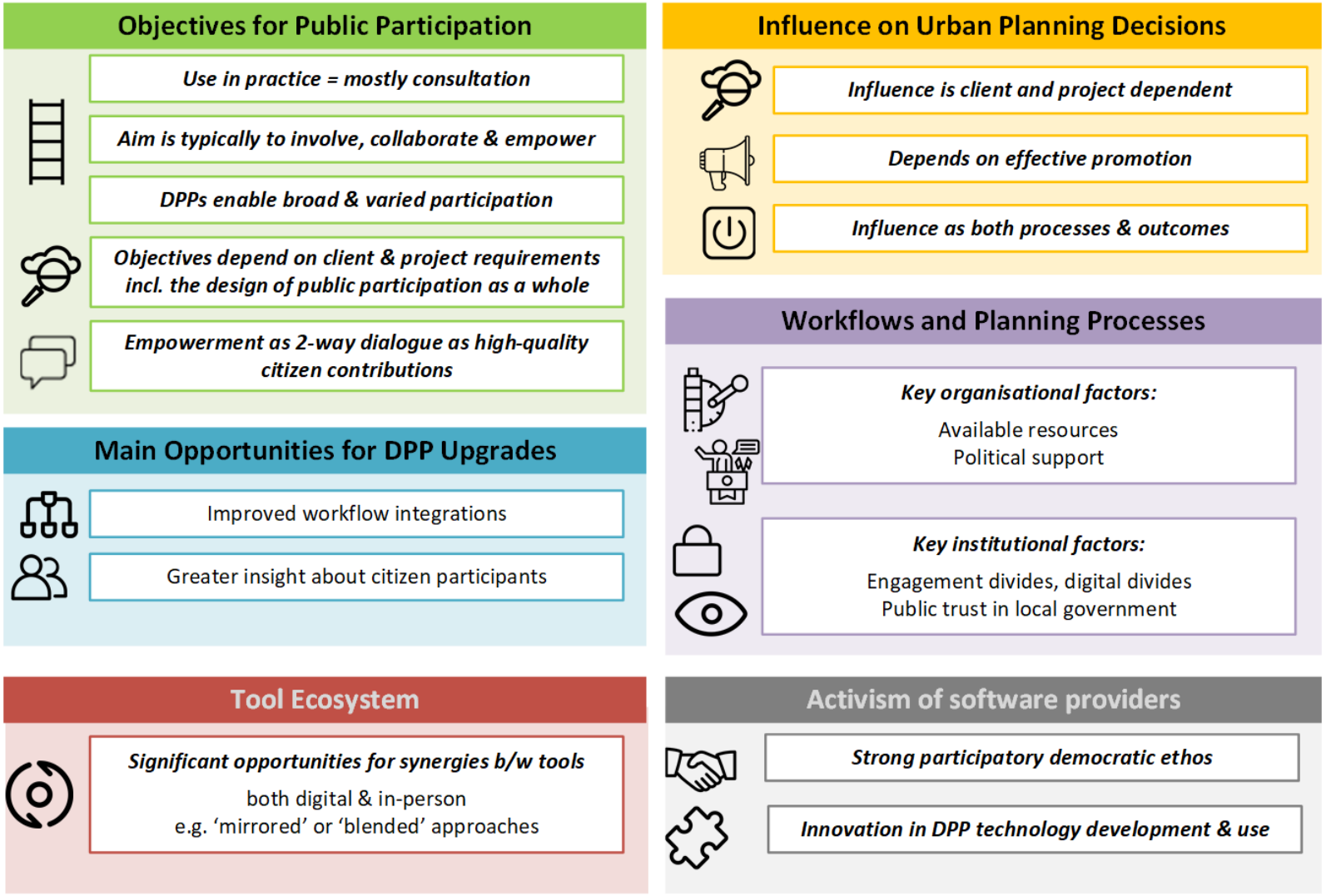
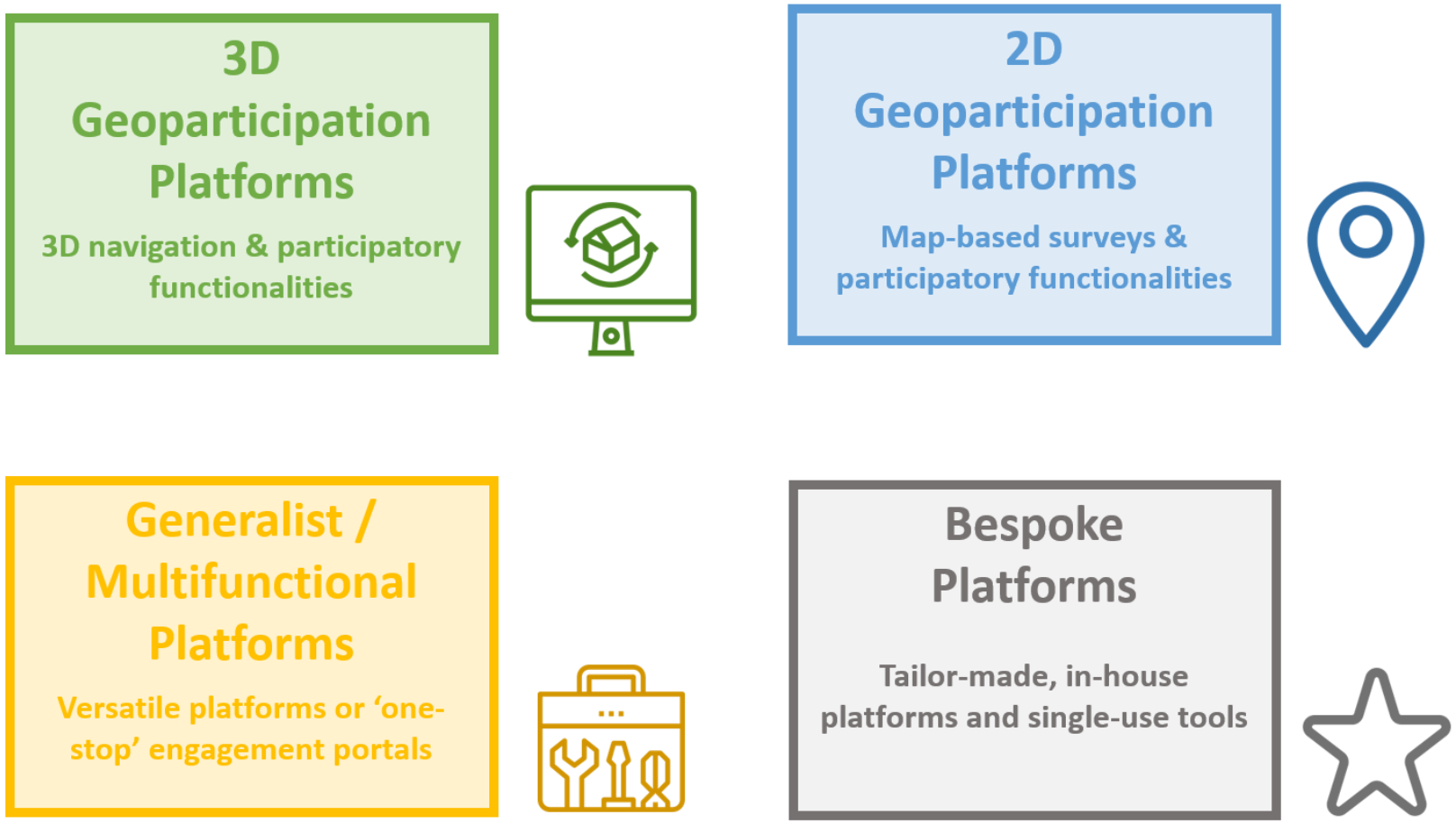


Figure 40 - Categorisation of DPP platforms as one of the key findings, based on reviewed cases.



10 Discussion: Main findings

10.1 Introduction

The main findings highlight the hybrid use of DPPs in urban planning, particularly the interdependencies between the various socio-technical themes. The Discussion chapter fuses the key findings from the surveyed planning professionals and software providers with the reviewed literature to provide practical insight about how to better take stock of and integrate DPPs' socio-technical hybridity in urban planning research and practice. The literature on digital participation widely acknowledges the importance of considering multiple technological, organisational and institutional factors. However, the empirical evidence remains scant, which is perhaps due to recent evolutions in DPP and participatory planning practices. In particular, the discussion chapter addresses the empirical contribution of the thesis by way of the five main thematic avenues of enquiry. The chapter is therefore largely framed around the five research questions that guide the research design of the thesis and build toward a much-need theory of DPP hybridity (RQ 6). The research questions are reiterated here:

RQ 1 Which objectives for public participation do DPPs enable?

RQ 2 Which levels of influence on urban planning decisions do DPPs enable?

RQ 3 Which technological features on DPPs are perceived as most useful?

RQ 4 How do DPPs complement other tools for public participation?

RQ 5 Which main organisational and institutional factors affect the adoption and use of DPPs in urban planning?

RQ 6 How can the use of DPPs be theorised to better reflect their hybrid use in urban planning?

In each section, the corresponding research questions are addressed based on a comparison of the findings and the literature review and are augmented by a discussion of their implications for the corresponding themes. Due to the thematic interdependencies that run through the findings and the literature, the discussion in each section has implications for the issues discussed in the other sections.

To emphasise this point, a discussion of the thematic interdependencies identified in the findings and the literature serves as a basis for future theoretical development to better capture DPP hybridity. The chapter concludes by making recommendations for practitioners and research about supporting conditions for an effective use of DPPs in urban planning.

10.2 Objectives for public participation

RQ 1 Which objectives for public participation do DPPs enable?

The original findings from the thesis indicate that DPPs are mostly used to involve, consult, involve and collaborate with citizens, and can facilitate multiple objectives simultaneously. Interestingly, the software providers expressed that consultation is the main objective in practice, with may stand at odds with more ambitious, tentative aims to involve, collaborate and empower. The objectives for using DPPs are highly contextual as they hinge on both project specificities, the design of the wider public participation process, and related technical design choices made by urban planning professionals, where objectives should align realistically with the level of influence which citizen participation is expected to have on decision-making. Furthermore, information is both a pre-requisite and core component of DPPs, rather than simply a low-hanging fruit. Finally, the aim to empower can be approached both through the conduct of effective participatory processes (e.g. as two-way dialogue and high-quality citizen contributions) *as well as* targeted levels of influence on decision-making.

The findings from software providers and planning professionals both indicate a wide range of project-dependent objectives for public participation for DPPs. Likewise, the literature takes stock of many different reasons for engaging the public relative to different project and online engagement needs (Brabham, 2013; Leighninger, 2011; Nabatchi & Leighninger, 2015). All 13 software providers highlight that objectives hinge primarily on client organisations' own level of determination to engage the public, and that DPPs that facilitate most engagement objectives on the IAP2 Spectrum. Planning professionals mostly stressed the multiplicity of engagement objectives, either simultaneous or sequential as per planning stage. Both groups of participants therefore pinpoint that there is no inherent engagement objective that is tied to DPP technologies. This finding contrasts perhaps with the literature about digital crowdsourcing, open source governance, neogeography/VGI and digital community planning which emphasise the emancipatory, empowering and inclusive dimensions of digital participation and its potential propel public participation toward the upper levels of Arnstein's ladder of participation (Anttiroiko, 2012a; Brabham, 2009; Falco, 2016; Graeff, 2014; Silva, 2013; Sui, 2015; Warf, 2013). Rather, the responses emphasise that the design of DPP applications and participatory processes will largely determine the objectives for public participation and related types of citizen-government interactions (Falco & Kleinhans, 2018a; Gün et al., 2019). This also implies that DPPs function as tools, or as means to an end, and rather than ends in themselves (Fung, 2015). To ensure that objectives are truly met, the interviewed planning professionals highlight the need to match objectives with realistic levels of influence (Nabatchi, 2012). This can safeguard the transparency of planning processes and maintain trust between citizens and local government (Arnstein, 1969; Davis & Andrew, 2018).

The findings also provide valuable insight about specific objectives on the IAP2 Spectrum. Beginning with information, it seems that the point of departure for effective public participation has lost its tokenistic veneer (Arnstein, 1969) or seemingly patronizing overtones (Skeffington Committee &

Shapely, 2014). In its most advanced form, information is a fundamental component of power, as discussed in detail in Section 10.3. Both planning professionals and software providers repeatedly stressed the importance of information in terms of awareness raising, explanation of complex planning procedures, and effective marketing of engagement opportunities via the DPP and other methods.

Planning professionals and software providers seem unanimous in valuing information as the basis for quality citizen contribution and meaningful dialogue between citizens and city agencies. Particularly considering high-level projects and complex planning procedures such as participatory budgeting, effective information was viewed as an absolute prerequisite by planning professionals. Software providers repeatedly viewed the long-term empowering nature of information provision via the DPPs as enabling hitherto disinterested citizens to find out about planning processes, if not begin to participate themselves. This insight seems to align with a social learning perspective to participatory planning as slowly enabling to bridge knowledge and communication gaps between planning experts and citizens (Innes & Booher, 2010; Kahila & Kyttä, 2009; Mihailidis & Thevenin, 2013; von Schönfeld, Tan, Wiekens, & Janssen-Jansen, 2019), with the alluring long-term potential to 're-enchant' local democracy (Healey, 2012).

The widespread objective of conducting needs & perceptions analyses and collecting feedback from citizens about plans and proposals indicate that DPPs are repeatedly used to consult residents, regardless of platform type. The aim to consult citizens lends itself to the use of surveys, which are a popular feature on DPPs. Such surveys are typically conducted early in planning processes. Interestingly, 2D and 3D geoparticipation seem to be typically used in a survey mode as found in the use-cases investigated here and in the corresponding literature (Babelon et al., 2016; Brown & Kyttä, 2014; Kahila-Tani et al., 2019; Sieber et al., 2016; Zhang, 2019). The collection of citizen feedback about final design proposals can also qualify as consultation. Starting with the 'Consult' category on the IAP2 Spectrum, local authorities should also ensure they provide feedback to the public about the manner in which citizen input has influenced decisions. The IAP2's 'promise to the public' counterpart to the engagement objectives binds professionals to link objectives with actual levels of influence, as discussed in Section 10.3.

A major finding relates to the perception by planning professionals and software providers about the tangible opportunities to leverage involvement, collaboration and empowerment via DPPs. Compared to the early 2010s, there now seems to be a wider range of DPPs that facilitate 'co-production' (i.e. involvement and collaboration) (Falco & Kleinhans, 2018b; Gün et al., 2019; Hasler et al., 2017). Out of a systematic review of over 110 DPPs, Falco and Kleinhans (2018b) that report about 25% of these qualify as co-production platforms. Types of planning projects that lend themselves to involvement and collaboration include the co-production of design solutions characterised by continuous

engagement (i.e. throughout a planning process). Projects that deal with active mobility solutions seem a typical case in point. Additionally, due to their iterative and participatory nature, participatory budgeting processes can feature varying levels of involvement, collaboration and empowerment depending on the roles of participants as budget delegates, project holders or voters. These levels of participation can also carry through beyond the duration of a single participatory budgeting cycles, for instance by raising greater awareness among participants about existing ecosystems of civic participation in their cities. An important related finding is that empowerment can be approached from the dual perspective of engagement objectives and perceived levels of influence. In other words, empowerment relates to both participatory processes and outcomes. As regards engagement objectives, the long-term aim often seems to be of fostering local cultures of participatory local democracy by way of digital participation, with a view to habituate both citizens and city staff to new participatory practices. The planning professionals often expressed a desire to involve and/or facilitate some degree of shared decision-making. Empowerment in the form of power delegation or citizen control is seldom on the planning agenda (Arnstein, 1969; IAP2, 2018), except perhaps to some extent for participatory budgeting, particularly at the voting phase. Interestingly, in cities like Paris and New York City, physical polling stations are an increasingly popular means of providing such power delegation, as opposed to DPPs.

When comparing the findings with the literature, one should note that only few empirical studies on digital participation address objectives for public participation in terms of the IAP2 Spectrum (e.g. Nelimarkka et al., 2014). Instead, the bulk of studies and reviews seem to address objectives in terms of normative goals of greater transparency, effectiveness and efficiency in participatory planning processes, which can entail various levels of co-production, dialogue, interaction and communication between local government and citizens (Afzalan, 2015; Czepkiewicz et al., 2018; Gün et al., 2019; Hasler et al., 2017; Kahila-Tani et al., 2019; Møller & Olafsson, 2018). These normative goals seem driven by some form of communicative planning theory or critical pragmatism (cf. Falco, 2016; Fung, 2015; Kahila-Tani, 2015; Nelimarkka et al., 2014; Rantanen & Kahila, 2009). In turn, a range of technological, organisational and institutional factors are mobilised by analysts in place of engagement objectives. These are mostly discussed in Section 10.3. Of relevance here, widely recognised goals for engaging citizens include collecting their views, ideas and preferences about various planning issues (Falco & Kleinhans, 2018b; Haklay et al., 2018). Ideally, the articulation of digital engagement should focus on substantive planning issues that matter to citizens. Furthermore, digital engagement opportunities should be deployed in ways that are in tune with citizens' needs, capacity and preferences (Gün et al., 2019; Leighninger, 2011; Rantanen & Kahila, 2009).

Although few studies have explicitly analysed the use of DPPs through the lens of the IAP2 Spectrum of Public Participation, Figures 42 and 43 attempt to benchmark the findings of the present thesis with

key reviewed literature. As indicated in the thesis, it may well be that the use of DPPs are progressively moving online public participation up the SPP, providing greater opportunities to involve and collaborate which hitherto were identified as theoretical or hypothetical in the literature at the turn of the 2010s (Falco & Kleinhans, 2018). DPPs that enable to empower seem largely the preserve of e-participatory budgeting, although closer analysis may reveal socio-demographic disparities in online participation relative to approaches that blended in-person and digital tools (Touchton et al., 2019). Regarding PPGIS, while some authors seem to indicate deeper forms of participation than in previous years (e.g. Kahila-Tani et al., 2019), others witness enduring pushback to involving the public in an impactful way (e.g. Brown et al., 2020). The literature review also largely reveals the need for more empirical studies to investigate and compare the objectives for using DPPs across different planning contexts.

Figure 41 - Benchmarking key desktop-based studies against the IAP2 Spectrum of Public Participation

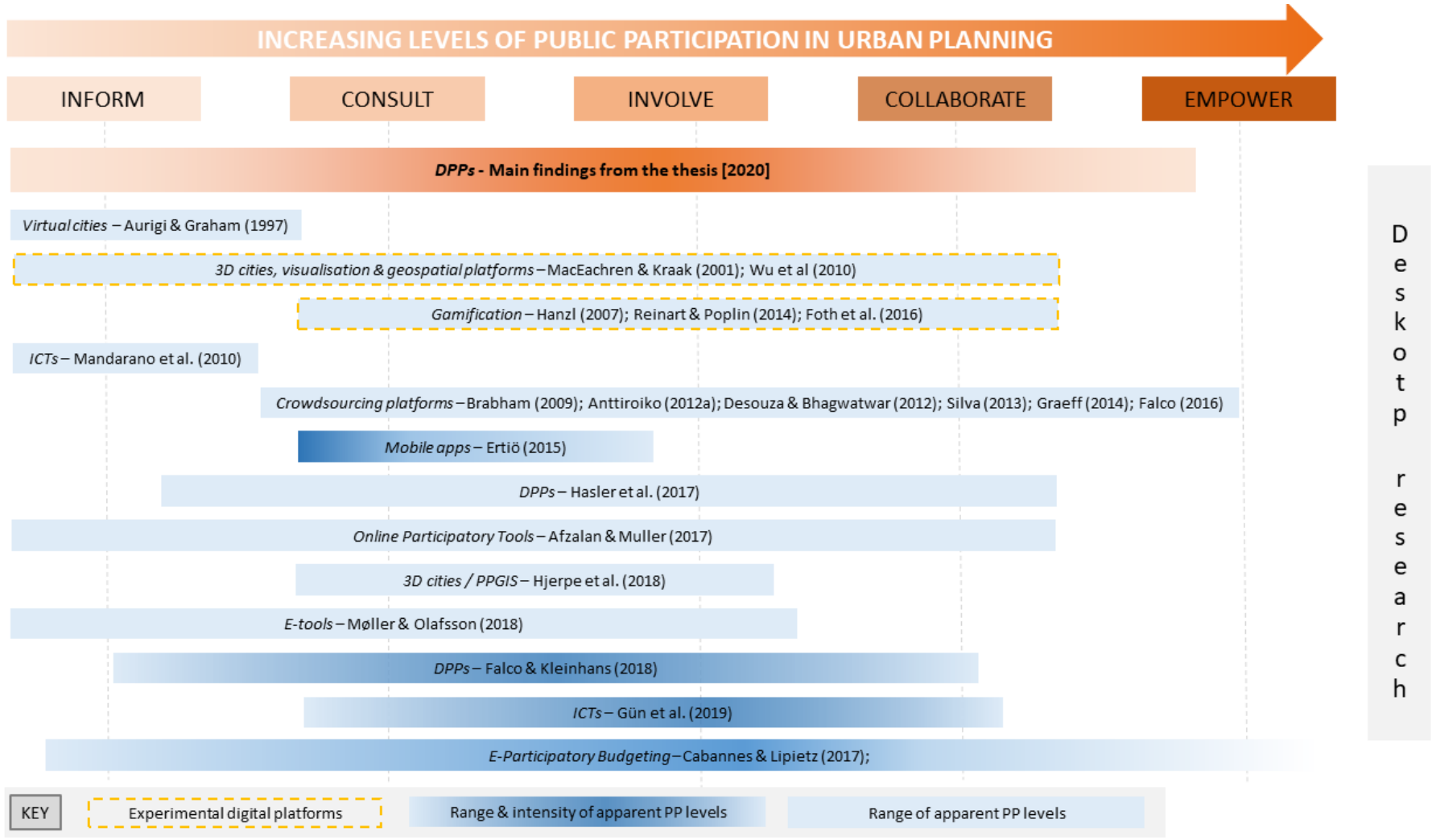
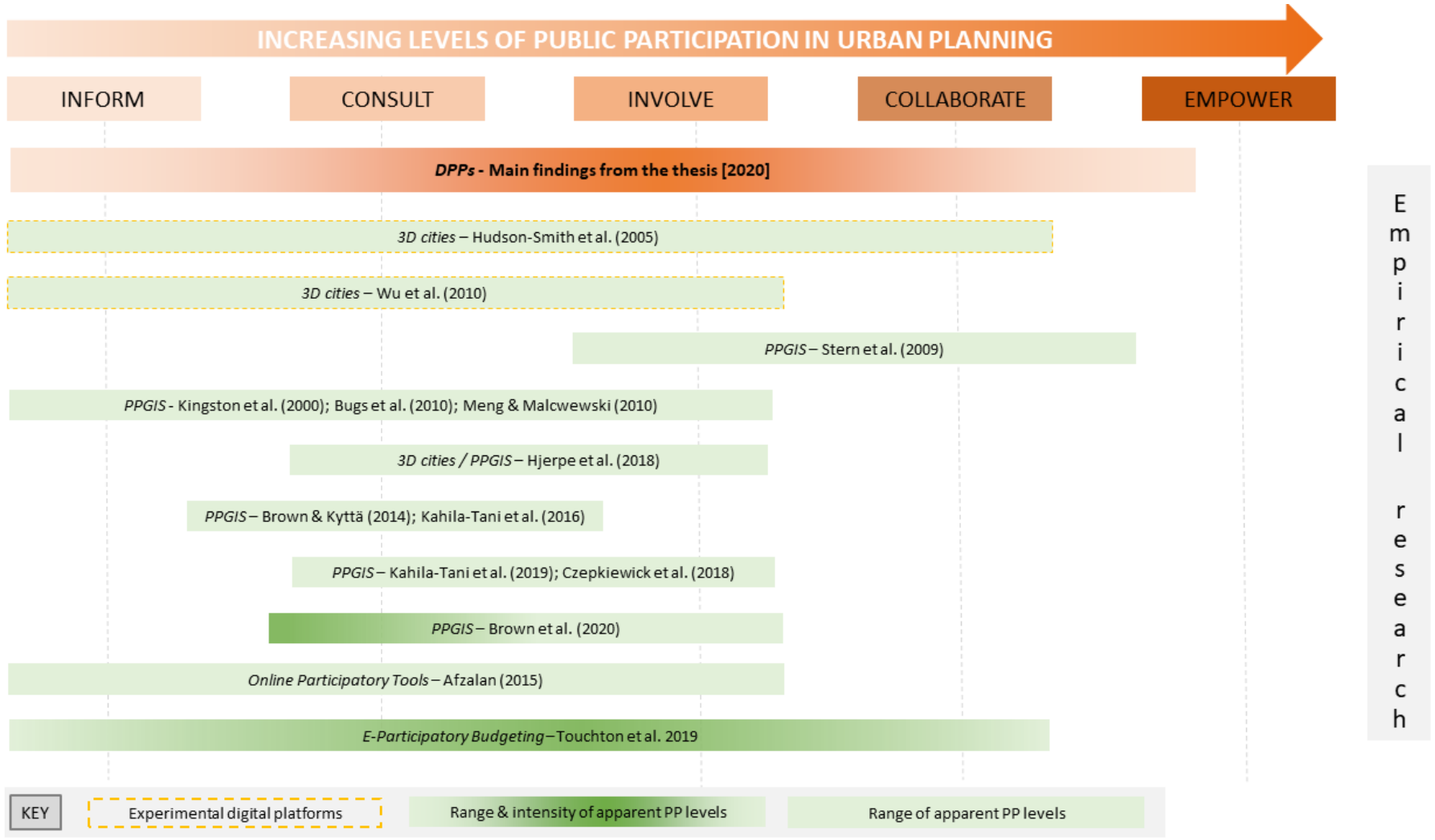


Figure 42 - Benchmarking key empirical studies against the IAP2 Spectrum of Public Participation



The findings also reveal the interpretive subjectivity and context-sensitive meaning of engagement objectives. Variations in the uses of terms takes place across countries, but also within the same countries, planning organisations and departments. Country differences concern the term 'consultation' as either a narrow engagement objective (Arnstein, 1969; Carson, 2008) or a comprehensive process of public participation underpinned by rigorous standards of practice in a UK context (R. Jones, 2017). Likewise, the term 'involvement' [*concertation*] is used by French planning professionals in France to denote a global public participation process (ADEME, 2016). Interestingly, the latter model of public participation portrays the objectives of tools for public participation as 'functionalities' of tools for public participation rather objectives per se. The diversity of terms is compounded by the diversity of their use and interpretation by planning professionals in different planning contexts. There are several cases in point, such as community engagement guidance documents, local democratic charters and engagement strategies produced by city agencies. A case mentioned by a software provider includes the city of Longmont which consistently utilises an adaptation the IAP2 Spectrum to all its online engagement projects. The scale comprises: 'inform', 'consult', 'involve' and 'partner'.[52] The responses from planning professionals reveal contrasting understandings of all of the IAP2 categories. Some planning professionals deemed it inappropriate to equate the DPP with any specific objective due to it being just a tool. Difficulties in differentiating between the different categories on the IAP2 Spectrum in their operationalisation have also been noted elsewhere by planning professionals (Carson, 2008).

Overall, the diversity of terms and their interpretations is both enabling and limiting. First and foremost, and in contrast to academic calls for uniform, standardised framings of community engagement objectives (Rowe & Frewer, 2005), diversity and subjectivity enables flexibility. Providing that it is internally coherent and systematic, the international scope of the findings indicate that a clearly defined engagement strategy allows agency staff to be context-sensitive and meet particular organisational and engagement needs. On the other hand, as argued by Rowe and Frewer (2005) and Stempeck and Sifry (2018), flexibility in the appropriation of engagement terminologies prevents effective benchmarking and comparison of the effectiveness of engagement strategies in different geographies and planning projects. Where engagement objectives are also used to qualitatively describe the influence of DPPs on planning decisions, terminological flexibility will also

[52] See the city of Longmont's Levels of Community Engagement on its engagement portal: https://engage.longmontcolorado.gov/?_ga=2.12378294.368250654.1572203374-1068199985.1572203374 [accessed 27 October 2019].

hinder benchmarking DPPs' influence in different locales and use-cases. This also has clear implications in terms of sharing research outputs about the field in different research contexts.

10.3 Perceived influence on planning decisions and processes

RQ 2 Which levels of influence on urban planning decisions do DPPs enable?

The original findings reveal that assessing the level of influence of DPPs is difficult if not impossible due to the complexity of planning processes and the difficulty of evaluating individual methods of public participation. Therefore, assessing and benchmarking public participation appears to be much more arduous in practice than what is often portrayed or advocated in the literature. Nonetheless, the following variables were identified as key determinants of perceived level of influence: the quality of citizen input on the DPPs, the 'depth' or intensity of participation, available data and metrics about participation (e.g. demographic data about participants, number of participants), and related dimensions of representativeness and inclusiveness. Some participatory process may lean more toward higher levels of perceived influence, although more generally speaking, levels of influence seem to depend on the eyes of the beholder as well as use-contexts. Influence can be approached through the dual lens of processes and actual outcomes. Influence also hinges on the effective promotion of participatory processes in general and DPPs in particular.

DPPs' perceived influence on planning can be approached most explicitly in terms of decisions, or 'outcomes'. Across the literature and the findings, the general view about the perceived influence on DPPs on planning seems to follow the observation made by P. Jones, Layard, Speed, and Lorne (2015):

> ICT is not a magic bullet for enhancing resident engagement in planning any more than participatory approaches guarantee good outcomes.

The findings highlight that the influence of DPPs on planning decisions is difficult if not impossible to isolate. This is partly due the nature of urban planning as a profession which needs to consider multiple, often competing sources of information (Burton, Jenks, & Williams, 2004; Hillier, 2008; Jenks, Kozak, & Takkanon, 2008). Within this context, DPPs are only one form of citizen input among others. The findings from software providers also indicate elected officials may also favour written comments at the expense of other forms of citizen input. Where digital citizen input is considered by decision-makers, important criteria include the representativeness, authenticity, credibility and quality of citizen contributions. Across the findings, the breadth of participation, particularly the degree of its representativeness of a larger population and the inclusion of diverse views, was perceived as a key determinant of DPPs' influence on planning decisions. In the literature, inclusion and representativeness are posited as normative goals (Afzalan & Muller, 2018; Brown & Kyttä, 2014; Czepkiewicz et al., 2018; Graeff, 2018; Senbel & Church, 2011a). In practice, the

findings show that it appears difficult to fully evaluate the representativeness of digital participation as information about participants is often elusive. Notwithstanding various proxy and direct measures of assessing who takes part on DPPs, the findings from both planning professionals and software providers indicate more can be done to know who participants are. At the same time, software providers also stress that DPPs are designed to generate mass participation rather than statistically significant samples of responses, as elaborate quantitative surveying methods exist precisely for that purpose (e.g. *Commonplace*, *Cap Collectif, Neighborland*). The literature also indicates that participation on DPPs can be underpinned simultaneously by open and representative samples of citizen participants, although local authorities may opt for open samples only (Kahila-Tani et al., 2016).

Closely related to the notion of representativeness is the perceived quality of citizen contributions. For geoparticipation, this primarily relates to the usefulness, spatial accuracy and credibility of citizen input data. Careless participation or lack of mapping/spatial skills on the part of participants affect the quality of citizen contributions, and hence reduce their likelihood to influence decision-making (Brown & Kyttä, 2014; Poplin, 2015). With data quality and representativeness come issues of credibility. Authenticity relates primarily to user registration (Falco & Kleinhans, 2018a; Narooie, 2014). User registration is a common requirement on DPPs, yet it may also affect participation rates. Furthermore, data privacy and security concerns however in relation to interrelated dynamics in smart city governance, big data, the sematic web, surveillance mechanisms and digital social networks that can potentially limit participation on DPPs, including for more marginalised citizens (Bertot, Jaeger, & Hansen, 2012; Falco & Kleinhans, 2018a; Gün et al., 2019; Hayduk, Hackett, & Tamashiro Folla, 2017; Power, 2016; van Zoonen, 2016).

There are also methodological issues related to the evaluation of DPPs' influence. Stempeck and Sifry (2018) indicate that obstacles to effective evaluations include: i) the disparity of metrics and measures used by organisations; ii) that the sharing of these evaluations is irregular, particularly considering projects deemed unsuccessful; and iii) both quantitative and qualitative assessments may be limited as either biased or too narrow in their scope. A more intrinsic and fundamental challenge is that 'causality is hard to prove in social environments'. For this reason, the most commonly available measures and metrics of participation consist of numbers: numbers of participants, comments, tweets about contributions, website views, invested capital, and so on. An additional challenge concerns the biased nature of evaluations that are produced by sponsor organisations themselves or by academic researchers who are pioneers and keen advocates of the participatory processes they investigate. Critical pragmatic methodologies exist to produce less biased accounts of DPPs' influence (Davis & Andrew, 2018), yet these do not seem widely adopted in the study of DPPs.

Due to the complexity of planning processes, difficulties in measuring outcomes, and the innovative dimension of DPP use, it seems more appropriate to treat influence in terms of both outcomes *and* processes. In fact, some landmark papers that seek to evaluate public participation focus on processes exclusively (Fagence, 1974). The effects of participatory processes may well extend beyond the formal duration of public participation processes. These may contribute to growing institutional capacity, familiarity with participatory practices and trust in local government over time (Alzahrani et al., 2017; Healey, 1997; Innes & Booher, 2010; Kahila-Tani, 2015; Lee & Kim, 2018; Myeong et al., 2014). The civic and participatory dynamics initiated during engagement processes can be expected to outlast specific planning projects, which was at least the hope or view formulated by several respondents (e.g. Durham PB, Oxford, Gothenburg, Nacka, interview with *coUrbanize*). Influential processes build on effective information. In complex planning projects, effective information provision and sharing between city agencies and citizens would not necessarily constitute an easy, preliminary step for effective engagement, as argued by some engagement professionals who recommend removing the 'information' level as an actual engagement objective (e.g. Carson 2008). A view of information as inseparable from other engagement purposes fosters a more empowering dimension of information as a basis for effective collective deliberation *and* action-based forms of participation such as cross-stakeholder collaboration and project co-delivery (see the discussion of John Dewey's work in Hildreth 2012, and in the chapter Public participation frameworks). In this sense, a Deweyian approach to information sharing and civic learning as a core stage in cycles of public participation may question more radical conceptualisations of information as the lowest form of tokenistic participation (Arnstein, 1969). While it should not arguably constitute the sole objective for engagement activities, information provision is far from being the "low hanging fruit" which some critical urbanists may claim it to be. At the same time, failing to provide sufficient information to citizens about the expected use of their input may jeopardise the effectiveness of the process as a whole.

At the same time, the participatory democracy turn in local government through such channels as participatory budgeting has proved incremental and unspectacular because not revolutionising power structures and institutional functioning, at the same time as it has led to clear changes in the conduct of participatory planning (Bherer, Dufour, & Montambeault, 2016). Cabannes and Lipietz (2018) observe possible tensions between political, good governance, and technocratic/managerial dynamics in participatory budgeting as political, which can be partly attenuated by focusing on the deliberative and empowering component of the process itself. On a global scale, however, some analysts argue that the limited emancipatory and empowering outcomes of participatory budgeting remains cause for concern, which may affect effectiveness of the processes themselves (Baiocchi & Ganuza, 2014). As such, it may perhaps be difficult to disentangle processes from outcomes. It also remains a matter of

perspective whether governance innovation in the form of DPPs remains subservient to neoliberal planning paradigms and actively frames public participation to exclude or "evacuate" substantive planning alternatives (Radil & Anderson, 2018; Swyngedouw, 2005b). Likewise, the level of criticality in analysis will determine whether the mainstay of DPP use really amounts to consultative, survey-based variants of tokenistic participation, or whether DPPs effectively enable to climb the ladder further up, on per case basis (Arnstein, 1969; Falco, 2016).

While ample models of digital participation, there seems to be a dearth of studies that assess the influence of DPPs on planning decisions. The literature that attempts to do so is rather critical about DPPs' real influence on planning processes and outcomes. Many hindrances to DPPs' influence are organisational and institutional, as discussed in the next section.

10.4 DPP Features

RQ 3 Which technological features on DPPs are perceived as most useful?

The most useful features on DPPs are not only those that facilitate participation itself by way of functionalities for citizen participants, but also, and perhaps most importantly, back-end data and consultation management capabilities which also reveal the greatest potential for technological improvement, including improving the capacity to collect demographic information about citizen participants. The findings also highlight that the effectiveness of DPP technological features is inseparable from their wider use context, such organisational capacity among urban planning professionals and institutional factors such as digital divides and citizens' trust in local government. Alongside technological development lies the significant potential to improve the design and integration of public participation processes in planning workflows and decision-making. In a nutshell, DPP technology is no silver bullet to effective public participation.

The technological features on DPPs can be classified as generic and specific. Interrelated generic features that are common among DPPs include: usability, 24/7 accessibility, ability-related accessibility, customisability, scalability, interoperability, mobile-friendliness (e.g. responsiveness), sets of functionalities that build on existing digital consumer services and aesthetics (e.g. social media, online maps), flexible user registration, cloud storage of background and citizen input data, among others (F. Biljecki et al., 2015; Billger et al., 2016; Evangelidis, Ntouros, Makridis, & Papatheodorou, 2014; Falco & Kleinhans, 2018b; Gün et al., 2019; Haklay & Tobón, 2003; Nanos et al., 2019; Narooie, 2014). Taken together, these generic features are recognised to enable to engage more citizens with more diverse views and in more flexible ways than traditional in-person methods for public participation (Afzalan & Muller, 2018; Desouza & Bhagwatwar, 2014; Griffin & Jiao, 2019; Kahila-Tani et al., 2019). This was a general finding among both planning professionals and software providers in this thesis.

On the whole, the interviews with software providers reveal that expected product upgrades target less improvements in terms of end-user functionalities (i.e. for citizen participants), but improved integrations in planning workflows and processes. This includes the deployment and optimisation of natural language processing and smart querying to derive most value out of citizen input. Additional product upgrades relate to the back-end data management and analysis tool, where available on DPPs. Planning professionals repeatedly mentioned the back-end data management tool to be essential for their work. It was one of the most valued tools and also the single most important tool with room for further development for the users of all platforms that provide it. For platforms that do not yet provide the ability to visualise and manipulate citizen input data, planning professionals sometimes expressed the desire to have one developed rather than having to perform all analyses in Excel and/or GIS software. This unanimous emphasis among all 13 interviewed software providers to target improved workflow integrations echoes with the literature on the use of Public Participation GIS (PPGIS) (Brown & Kyttä, 2014; Kahila-Tani et al., 2016; Kahila-Tani et al., 2019) and Planning Support Systems (Brömmelstroet, 2013, 2016; Geertman, 2017; Pelzer, Geertman, Heijden, & Rouwette, 2014; Pettit et al., 2018) in urban planning. The latter studies and reviews report implementation gaps in terms of technology adoption and/or use of input data in planning processes. For instance, Kahila-Tani et al. (2016) reported that planners did not directly utilise the citizen input data from the PPGIS platform in their software packages, as part of the masterplanning in Helsinki. A wider study reveals on the other hand that planners increasingly make use of the data across different projects (Kahila-Tani et al., 2019). Generally speaking, the usability of PSS needs to be improved, as planners ask for platforms that are simple to use (Geertman, 2017; Pettit et al., 2018). While DPPs are custom-built for efficient use by planners, the findings reveal room for further improvement.

On the end-user side (i.e. functionalities open to citizens), the findings from planning professionals identify opportunities to improve the drawing functionality in geoparticipation. This echoes with literature about difficulties encountered by citizen participants in using the drawing tool (Gottwald et al., 2016; Poplin, 2015). Generalist tools also seem to provide more basic geoparticipation functionalities which do not quite compete with specialist geoparticipation software. At least in terms of geoparticipation, therefore, generalist platforms may appear as ‘Swiss army knives’ of public participation that cannot provide similar in-depth interaction capabilities as more specialist software. Other important end-user functionalities that were valued by planning professionals include surveys, ideation, and commenting. Importantly, these can enable to leverage co-production (Falco & Kleinhans, 2018b), or consultation, contribution and collaboration (Hasler et al., 2017). As highlighted in the findings from planning professionals, DPPs are not necessarily viewed by as enabling effective dialogue, however. Improvements to the DPPs in terms of dialogical capabilities could therefore be needed, for instance on geoparticipation and generalist platforms. Furthermore,

participatory budgeting officers have identified opportunities to improve direct interaction and collaboration between citizens on e-PB portals. In the literature, perceptions about the dialogical capacity of DPPs vary (Desouza & Bhagwatwar, 2014; Ertiö, 2015; Graeff, 2018; Hasler et al., 2017). Some analysts contend that even crowdsourced reporting apps such as SeeClickFix mediate political empowerment, while others view them as merely providing one-way communication flow from citizens to planners (cf. Ertiö, 2015; Graeff, 2018). As discussed above in relation to the aim of consulting citizens, surveys seem to constitute a popular use of DPPs in planning to collect views and gather feedback about a range of issues. Despite the availability of a range ready-to-use evaluation frameworks in the literature, it remains unclear how different DPPs perform in terms of dialogical capabilities in practice. More empirical studies that compare different types of DPPs in real urban planning cases are needed to fill this gap in knowledge

DPPs can also be reconceptualised as ecosystems of tools. Not only can they function as tools, even the more basic DPPs typically feature a range of functionalities. This 'diversity of tools within a tool' was mostly advanced by planning professionals who used generalist/multifunctional platforms. Likewise, software providers who leverage these software were keen to highlight the functional versatility and scalability of their platform. Software providers also recognised functional blind spots (i.e. valuable missing functionalities) where these were apparent. The findings indicate that individual DPPs' strength lies in their unique range of technological features. As with any tool, their strength is also their main weakness. Even the most versatile platforms (e.g. *Decidim*, *Bang the Table*) cannot outperform more specialist platforms. In that sense, functional versatility is as a type of specialisation. This trait becomes a selling argument for generalist software companies and positions them in a specific part of the DPP market. To date, however, none of the DPPs quite function as the all-purpose, 'one-stop' e-Planning portals envisaged in Kingston (2002) that would centralise all participatory and administrative planning activities in one digital location.

A related finding concerns the potential shift from DPP tools to methodologies. Software providers discussed the need to consider digital engagement methodologies rather than discrete tools (*Carticipe*, *Neighborland*, *Bang the Table*, *Commonplace*, *Bästa Platsen*). Engagement 'mirroring', 'phygital' participation, 'mixed modes surveying', and 'continuous engagement' are terms that were highlighted by software providers (respectively: *Bang the Table*, Cartice, *Neighborland* and *Commonplace*). These four terms highlight different methodological aspects of digital participation as requiring consistent and systematic coordination with other modes of public participation and data collection about citizen views and preferences. Mirroring and mixed modes surveying emphasise the necessary systematic and complementary nature of different modes of data collection, as different methods of data collection and engagement attract different people with potentially conflicting views (Brown, 2016; Brown, Strickland-Munro, Kobryn, & Moore, 2017; Brown, Weber, Zanon, & de Bie, 2012;

Pocewicz et al., 2012; Stern et al., 2009). The phygital approach creates a synergy between physical and digital modes while centralising all engagement activity on the DPP for reasons of transparency, accountability as well as ease of data processing. It also enables to make the best of both digital and in-person modes of engagement to leverage citizen contributions of high(er) quality (Biggs, 2015; Nabatchi & Leighninger, 2015). The notion of continuous engagement also entails that digital participation can accompany the full life cycle of urban planning policies (Kahila-Tani, 2015), including by providing feedback and updates at times in the planning process that do not require any engagement activity. The interviews with the software providers indicate the capacity to fully utilise DPPs as methodologies rather than tools requires some level of engagement maturity or at least significant determination on the part of planning organisations. This finding echoes with authors who advocate for the deliberate and conscientious utilisation of participatory technologies (Falco, 2016; Fung, 2015).

10.5 DPPs within ecosystems of tools

RQ 4 How do DPPs complement other tools for public participation?

Rather than functioning just as individual tools for public participation, DPPs are deployed both *within* wider ecosystems of tools and *as* ecosystems of tools in their own right. The latter is particularly true of versatile, multifunctional platforms and one-stop engagement portals that facilitate a whole array of tools and functionalities (e.g. Cap Collectif, Neighborland, Decidim, coUrbanize, among many others reviewed here). Furthermore, the most effective DPPs seem to be those than are used in conjunction with in-person engagement methods to create synergies and interdependencies between digital and 'boots-on-the-ground' methods (i.e. 'blended' or 'mirrored' approaches to the conduct of public participation).

As presented in the different use-cases, the adoption, deployment and evaluation of DPPs for participatory planning is inseparable from the ecosystem of tools in which it is used. Both the State-of-the-Art and the findings from the software providers reveal that digital technologies should be considered as a valuable, if not essential, complement to in-person methods. However, they cannot substitute them, nor should they aim to (Aitken, 2014; Biggs, 2015; Czepkiewicz et al., 2018; Falco & Kleinhans, 2018a; Kahila-Tani et al., 2019; Sieber et al., 2016). Primary causes are the digital and engagement divides in society, which entail that different tools and methods will reach different people. , in-person workshops and meetings may attract participants with different views and online tools than online tools (Brown et al., 2014; Erete & Burrell, 2017). Few academic publications that focus on DPPs also seem to explicitly consider complementary in-person tools and methods used in urban planning. For the academic publications that do take stock of the wide range of participatory tools used in local government, few studies attempt to assess their use-value for different planning

purposes (Nabatchi & Leighningher 2015, Fung 2006, Slotterback 2011). Few publications, if any, seem to consider the use of tools as *ecosystems*; that is, beyond mentioning the fact that in-person and digital technologies are complementary. Inventories of tools seem more common, both in the academic literature and in guidance produced by government agencies (Abelson et al., 2001; Banque des Territoires, 2018; Gün et al., 2019; Hanzl, 2007; Leighninger, 2011; Nabatchi & Leighninger, 2015; OECD, 2001; SKL, 2010). The notion of 'tool ecosystem' emerged primarily from the interview with a respondent at Lille metropolitan agency. This said, the importance of deploying arrays of tools or using all available communication and engagement channels was mentioned by the vast majority of planning professionals across all platform types and type of planning project. The most popular tools included social media, planning workshops, street-level engagement, in-person events and fairs, targeted stakeholder group outreach and supporting printed materials such as postcards and flyers. It may be that city agencies that utilise DPPs also proactively use broad ecosystems of tools. Future research could test whether such correlation between DPP usage and a diversity of other engagement tools exists.

The use-cases in the thesis sometimes feature an iterative use of DPPs, typically at different stages of the planning process. An initial phase of broad engagement normally occurs early in the planning process (e.g. needs or perceptions analysis with geoparticipation). It can be followed by in-person workshops for the in-depth exploration of planning options. The participatory process can also be closed with another iteration of broad engagement in the form of consultation about specific design proposals. This iterative, multi-stage approach to engagement echoes with recommendations by an experienced community engagement practitioner at *MetroQuest* of combining "high-tech" (initial broad engagement) with "high touch" (professionally-facilitated in-person events), followed by a subsequent phase of "high-tech", which results in a bow-tie or double funnelled shaped process of combining both breadth and depth of engagement (Biggs, 2015). As part of a phygital (i.e. combined digital and physical) approach to public participation, online platforms can also advertise and/or feature summaries of offline engagement (Afzalan & Muller, 2018; Erete & Burrell, 2017). This took place for example on *Neighborland* in Raleigh and is also common for *coUrbanize* use-cases. Furthermore, in-person methods remain vital as digital methods may not lend themselves to all types of planning projects. At a planning conference that helped to assess the challenges to the use of PPGIS in spatial planning, planning professionals reported that 'strategic level questions [are] difficult to answer without face-to face discussions' (Kahila-Tani et al., 2019, p. 54). Likewise, the findings from planning professionals in this thesis reveal that in-person workshops were often more suitable to co-produce sustainable mobility solutions (e.g. Hamburg, Oxford, Waltham Forest, Newcastle), planning orientations (e.g. Lille metro, Grenoble metro) and collaboration (all French participatory budgeting use-cases; Durham PB) than the actual DPP. Interestingly, the DPPs often contributed to

shape the content of the in-person workshops, which would then shape another round of online engagement on the DPP. Such iterative online-offline synergy seems under-monitored in the academic literature.

Another emerging finding that seems to distinguish practitioners' experience in the thesis from many academic publications is the emphasis on combining arrays of tools as part of *methodologies* and/or *strategies*. As observed by other authors, the academic literature seems to dwell on the use of specific tools rather than use-contexts or methodologies (Falco, 2016; Hasler et al., 2017). A tool, when properly embedded in a strategy and ecosystem of tools, has to potential to become a method (Biggs, 2015; S. Bishop, Cochrane, & Coleman, 2013; Jankowski et al., 2015; Kingston, 2002). The next frontier for empirical research would seem to identify which ecosystems of tools function best for specific planning contexts. The attempt to isolate the performance of individual tools is laudable for benchmarking and comparative purposes (Fung, 2006; Stempeck & Sifry, 2018). However, the findings in the thesis indicate that tools are only fully operative when deployed as ecosystems. A significant challenge also relates to the fast pace in combined evolutions in technological development, participatory planning, local democratic dynamics, and digital consumption practices in society. In practice, the attempt to make sense of 'what works in what context' might feel like aiming for a constantly moving target. DPP innovation as embedded in ecosystems of tools may also be a contextually-specific art rather than a science.

10.6 Organisational & institutional factors

RQ 5 Which main organisational and institutional factors affect the adoption and use of DPPs in urban planning?

Beyond confirming key adoption and use factors already identified in the literature (DPP cost, range of functionalities, public trust in local government and attitudes toward digital tools and public participation), the findings also identify staff skills, the availability of guidance materials and city-wide engagement strategies and various other intra-organisational resources as key determinants of the effectiveness of DPP use. In particular, the findings indicate cross-departmental collaboration among staff as essential, including the capacity for innovation and iterative learning, as well as the quality of collaboration between software providers and urban planning professionals. Interestingly, the advocacy and strong participatory ethos of software providers is key to fostering innovation among local government staff. Last but not least, political support underpins both the design and integration of participatory processes in decision-making, including indirectly through overall resource allocation.

The main opportunities and hindrances to DPPs' influence on urban planning decisions seem to be organisational and institutional. In particular, these relate to intra-organisational workflows and

planning processes. The findings from the planning professionals and software providers pinpoint to multiple dimensions that determine the adoption and effective use of DPPs. The same sets of factors can be either enabling or limiting. Factors that guide DPP adoption primarily relate to platform cost (and therefore the availability of budgets) and the range of DPP features. Financial resources, especially, can largely be dictated by elected officials at the city agencies. Likewise, they may also dictate the adoption of a DPP, although the actual choice remains at the discretion of agency staff as dictated by engagement needs and procurement procedures in place. The literature that helps city agencies choose the right DPPs for purpose list pragmatic and technical considerations, which are mainly articulated around engagement objectives, knowledge needs, the capacities and interest of the community (i.e. citizens), and the creation of public value (Afzalan et al., 2017; Leighninger, 2011; Nabatchi, 2012). Part and parcel of these considerations is the aim to ensure the transparency, accountability, effectiveness and efficiency of participatory planning processes (Fung, 2015; Marzouki, Lafrance, et al., 2017; OECD, 2001, 2003; Poorazizi, Steiniger, & Hunter, 2015). While the findings here are based on planning organisations that have chosen to engage the public via DPPs, critical authors view that there are significant hurdles to the uptake of DPPs and effective participatory practices in local government, such as: red tape, lack of financial resources for public participation, lack of political will, lack of engagement skills, experts' distrust of citizen knowledge and/or insufficient interest in participatory technologies (Brown & Kyttä, 2014; Deas & Doyle, 2013; Fung, 2015; Kahila-Tani et al., 2019). Once DPPs are adopted, the findings from both planning professionals and software providers show that the same factors (political will, availability of resources, attitudes toward DPPs and participatory processes) will enable or constrain the use of DPPs at city agencies. These vary between cities (Kahila-Tani et al., 2019, p. 54):

> The identified potential advantages and disadvantages are highly context-dependent, valid in one situation but invalid in another.

Writing about Planning Support Systems (PSS) specifically, Geertman (2017, p. 73) highlights that:

> The acceptance of PSS in planning organizations is mostly hampered by insufficient cooperation between planners and PSS experts, and by insufficient communication within the organization, especially between organizational management and innovative precursors.

Although DPPs are less technical than the type of software commonly alluded to in the PSS literature, they support planning in integrating the views and ideas of citizens in existing workflows. The findings in the thesis indicate that role of digital participation experts or champions within the organisations were important. All planning professionals who participated in the research conducted some form of digital participation as part of their professional capacity as urban planner, community engagement officer, communications officers or participatory budgeting officer. They typically functioned as the administrators of the DPPs. In contrast to many of their colleagues within the

organisation, they held some form of skill, expertise or incumbent responsibility with regards to community engagement. They shared both positive and less positive experiences related to intra-organisational communication and collaboration. Software providers' capacity as technology experts was at times lauded and at other times criticised as not sufficiently responsive to technical difficulties as planning professionals would have wished. In turn, the findings from the planning professionals and software providers indicate that existing workflows both shaped the manner in which the DPPs were used, and in turn were reconfigured based on the experience of adopting DPPs and associated participatory practices. Organisation staff that used DPPs over the course of over a year seem to have learned in the process, leading to cycles of learning and modified workflows with cumulative experience. Long-time adopters of DPPs (e.g. participatory budgeting pioneers such as New York, Paris, Reykjavik) were still learning with time and facing new challenges in terms of workloads, intra-organisational collaboration and communication. Experience with DPP use over time could lead to new engagement needs, for instance product upgrades to the DPPs. Such dual processes of iterative DPP use and concurrent evolutions in workflows and technologies inform a proposed life cycle of digital participatory platforms, as presented in Section 6.

The main institutional factors identified in the findings and literature pertain to politicians', planning professionals' and citizens' attitudes toward DPPs and participatory planning, public trust in local government, digital divides and engagement divides. Planning professionals and software providers in the findings typically recognise the importance of managing citizens' expectations through effective communication about engagement opportunities and continuous feedback to the public about the use of citizen input in planning decisions and processes. This said, day-to-day workflows, the long duration of planning processes and institutional constraints did not always enable this. Other factors included perceptions of international and national political undercurrents, including populist discourses, social movements, internet governance and shifting political regimes. Planning professionals and software providers seemed to display through their responses an engaged ethos, if not a type of activism, that sought to relate to the mentioned undercurrents by means of innovative local democratic principles and practices. Planning professionals and software providers occasionally recognised in each other such an ethos. This framing of public participation through participatory local democratic principles is discussed more as governmentality under Section 2.2.3. The latter principles also seem to be emulated in professional networks where software providers and planning professionals can meet each and share experience and insight about engagement solutions.

In all empirical studies are lacking about the combined organisational and technological dimensions that underpin DPP innovation. Analysts have highlighted the manner in which digital innovation through crowdsourcing and Planning 2.0 could help change and improve planning practice and governance (Anttiroiko, 2012a, 2012b; Brabham, 2013; Castelnovo et al., 2016; Albert Meijer &

Bolívar, 2016). Yet the foresight and analytical frameworks provided by the latter deserve greater empirical investigation by practice.

A core component of DPP innovation is the type of political leadership in municipalities/local councils that translates into local democratic charters, practical guidance documents and overarching public participation strategies. The presence of a clear public participation strategy endorsed by municipal political boards was a key driver of resource allocation for the adoption of DPP as part of a wider tool ecosystem. In several instances, a local democratic plan or charter guided this strategy. Where political support facilitated the allocation of adequate resources, such as staff time, engagement expertise, and budgets for marketing and the conduct of engagement activities, one could perhaps speak of *resourcefulness*[53] rather than simply resource availability. Indeed, participatory planning practices such as participatory budgeting processes were often put in place rapidly to meet political requests, at least at their outset. In most instances, a significant level of skill, creativity, flexibility and resilience in implementing DPPs and the associated participatory planning processes was required on the part of community engagement professionals and/or urban planners. The practice of DPP innovation hinged on significant resourcefulness to manage its many socio-technical components, as part of wider engagement strategies.

The need to provide sufficient resources for public participation seems widely recognised in both the academic and practitioner literature (Afzalan & Muller, 2018; Afzalan et al., 2017; Brown & Kyttä, 2014; Falco & Kleinhans, 2018a; Leighninger, 2011). However, the notion of resourcefulness, i.e. of being able to adapt quickly, constantly, and professionally in managing citizen and political expectations while simultaneously exploring new technological functionalities (and disruptive technological mishaps) in different projects, seems less addressed. Key components of resourcefulness identified in the findings include: i) skills and experience in initiating and managing community engagement; ii) familiarity with DPP technology and knowledge about how to deploy it alongside other tools and methods; iii) effective collaboration with other staff and elected officials at the planning organisation or other local government agencies (e.g. between a city agency and a metropolitan agency); iv) effective collaboration with various stakeholder groups (including citizens); and v) access to support networks of fellow practitioners in the form of annual thematic conferences and/or seminars (e.g. various national participatory planning conferences), and possibly even webinars (which are commonly delivered by national planning institutes and software companies). Concerning the latter, influential international conferences include TiCTEC conference hosted by

[53] Lexico.com (i.e. Oxford University dictionaries) defines resourcefulness as: "The ability to find quick and clever ways to overcome difficulties." [accessed 23 August 2019].

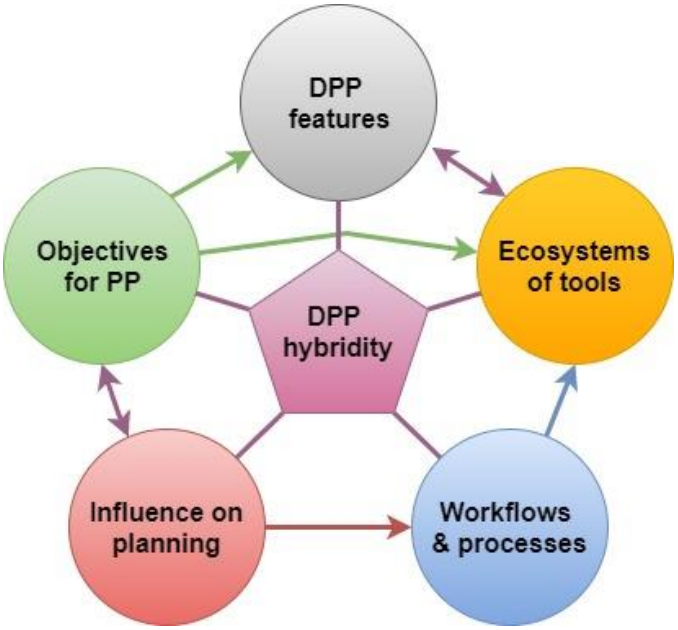
MySociety, which enable the sharing of best practice and experience among planning professionals and extensive networking opportunities between practitioners, researchers and software providers.

Some types of planning projects and platforms seemed to benefit from greater access to such supporting networks than others. For instance, national participatory budgeting networks and/or conferences seem particularly active in fostering mutual learning and networking, with personal professional ties extending beyond the fixed duration of the networking event. Software-based networks and communities also seem to support community engagement staff's resourcefulness. The MetaDecidim community (e.g. Helsinki PB, Lille metro, interview with OSP) is a case in point, motivated by a strong Open Source ethos in advocacy of equally open local democratic practices. Nearly all software providers constitute a community of practice or users of sorts, through such various means as their newsletter, thematic blogs, webinars, extensive online resources and practical guidance documents, and/or in-person seminars (e.g. *coUrbanize*, *Social Pinpoint*, *Bang the Table*, *Neighborland*, *Cap Collectif*, *Commonplace*).

10.7 Thematic interdependencies

The original findings of the thesis extend beyond sheer lists of essential components of effective public participation by highlighting and dwelling on the required *interdependencies* between all the identified factors to enable effective DPP use. The findings indeed reveal webs of interdependencies between the five socio-technical themes that guide the research. In order to appropriately build up to the theoretical development of the thesis, this section pinpoints some of the main thematic interrelations arising from the findings and discussion. The aim is here is to bring together all the individual points of evidence and interrelations presented so far to highlight the necessary thematic synergies in order to tap into DPPs' full potential as tools and methods. Figure 44 illustrates some of the main identified thematic interdependencies. These interdependencies are indicative rather than exhaustive.

Figure 43- Overview of some of the thematic interdependencies identified across the findings



Objectives & Influence

Objectives for public participation benefit from being aligned with realistic levels of influence. Objectives and influence are therefore interlinked. Citizen and political expectations about ensuring the transparency and accountability of planning processes underpin a clear articulation of both objectives and expected levels of influence on planning decisions (Nabatchi & Leighninger, 2015). At the same time, the meso-investigation also identifies opportunities to provide more comprehensive and regular feedback to the public about the use of citizen input in planning. In particular, there seems to be a need for evaluations of engagement processes that thoroughly consider the global value of citizen input within and across planning projects (Nabatchi, 2012). This is predicated on the ability to monitor, but should not be limited to, quantitative metrics of public participation, however essential these may be for benchmarking purposes (Douay & Prévot, 2015; Sieber et al., 2016; Stempeck & Sifry, 2018). Furthermore, evaluations can strive to clearly highlight the relative value of each engagement method (Gün et al., 2019; Hasler et al., 2017), including how DPPs complement in-person methods and other digital methods (Brown et al., 2014; Pocewicz et al., 2012), even when their individual influence cannot be isolated.

Objectives, DPPs & Ecosystems of tools

Objectives for public participation can determine the specifications for the choice of a DPP, as well as which sets of tools/ functionalities to use on multifunctional DPPs, alongside other PP tools (Afzalan et al., 2017; Falco & Kleinhans, 2018a). The need to inform and raise awareness about planning projects and engagement opportunities, as well as to provide post-hoc feedback to the public about

how citizen input has been used in planning, particularly determine the use of appropriate tools. The same applies for forms of involvement and collaboration that cannot be facilitated on DPPs. DPPs seem to function best by complementing other tools as part of ecosystems of tools, each meeting particular sets of engagement objectives. Due to their intrinsic differences, DPP features and the capabilities of other tools determine each other's value (Afzalan et al., 2017; Falco & Kleinhans, 2018b).

Objectives, DPP features & Workflows/processes

Objectives for public participation are largely determined by the capacity to engage and are underpinned by a clarity of purpose (Afzalan & Muller, 2018; Afzalan et al., 2017; Fagence, 1974). The latter translates as the availability of material and human resources, including engagement skills, familiarity with DPPs, engagement strategies, and the capacity to learn, experiment and collaborate. Objectives also spring from a determination to engage, which hinges on positive attitudes toward DPPs and participatory planning among planning staff and elected officials (Falco & Kleinhans, 2018a; Kahila-Tani et al., 2019).

The capacity and determination to engage also determines the choice of DPP type and features. At the same time, the deployment of DPPs contributes to reshape planning workflows and processes (Anttiroiko, 2012a, 2012b; Kingston, 2002). Collaborative functionalities in the back-end data management and design interface particularly foster collaboration within and between departments at planning organisations. DPPs can also mediate collaboration among different stakeholder groups. The features on DPPs thereby enable to engage in novel or different ways, which opens up avenues for a range of engagement objectives. Through experimentation with DPPs, client organisations can identify opportunities for software improvements and request them from software providers so as to better meet their needs and continue to engage citizens in novel and creative ways.

DPP features, Ecosystems of tools & Workflows/processes

The embedding of DPP features within ecosystems of tools can either facilitate or complicate their design and management. The majority of use-cases indicate the need for appropriate resources and capacity to make best use of synergies between tools. Large-scale and technically complex planning procedures particularly benefit from the effective design and coordination of tool synergies. Growing acculturation with participatory tools can in turn foster recursive innovation in technology development and participatory planning practices (Anttiroiko, 2012a, 2012b).

Ecosystems of tools, Workflows/processes & Influence

Synergetic uses of tools enable to raise their perceived value in evaluations of public participation processes. The effectiveness of ecosystems of tools is potentially greater than the sum of the

individual tools. Such effectiveness hinges on clear and detailed engagement strategies, methodologies, and capacity (Kahila-Tani et al., 2019; Rosener, 1978). Synergies are particularly apparent in iterative participatory processes where DPPs and other engagement activities shape and complement each other over time. Additionally, acculturation with DPPs and participatory planning practices accrue over time beyond the duration of individual projects, which can help establish or strengthen trust between planning organisations and citizens.

Synergetic socio-technical interdependencies

In a fictional ideal world of DPP and public participation innovation, planning organisations would make synergetic use of the socio-technical interdependencies presented here. Exemplar or flagship use-cases seem to be those that strive to coordinate and optimise such interdependencies as best as possible, as per context. In the real world of planning, however, various contextual constraints can arise, such as: tight planning timeframes, limited resources, lack of trust between planning organisations and various publics, lack of engagement skills, digital and engagement divides, and the absence of clear engagement strategies or objectives. Technical and technological obstacles can include: inappropriate technologies, sub-optimal technical support and a poor utilisation of different engagement methods. Given the contextual nature of DPP innovation, there does not seem to be any one-size-fits-all recipe to the effective management of these socio-technical interdependencies. Furthermore, the identified interdependencies presented here are not exhaustive. Notwithstanding, they are indicative of some of the main findings across DPP type, type of planning project, and project location. Altogether, this brief overview of the multiple interconnections between the different socio-technical factors investigated in the thesis constitutes the foundation for a theoretical development of DPPs' hybridity, for example through the lens of a cyborg-based approach to socio-technical systems (Babelon et al., 2016; Gandy, 2005; Haraway, 1990; Swyngedouw, 1996). Such theoretical development deserves substantial space of its own, which will be duly elaborated in future research outputs that lie beyond the scope of this PhD thesis.

10.8 Exploratory DPP life cycle

On the basis of all the aforementioned discussions, an exploratory 'life cycle of DPP' emerged from the data. Figures 45 and 46 present an exploratory life cycle in a flow chart diagram from the perspectives of urban planning professionals and software providers respectively. Due to the breadth of the research design, the data collected from software providers and planning professionals typically covered most aspects of DPP adoption, use and evaluation about potential renewed use. Because of its exploratory and analytical nature, the DPP life cycle is presented here as an element of discussion. The path of DPP adoption and use can provide preliminary recommendations to practitioners, as a build up to the recommendations in the next section. It also re-illustrates the thematic

interdependencies discussed above, and also serves to articulate the agency of DPPs as an actor in its own right, notably in contributing to reshape planning workflows in iterative ways.

The typical life cycle of a DPP seems to begin with a political request to engage digitally. This is often formulated by an agency's political boards and can emanate from politically endorsed municipal strategies and/or detailed guidance about the conduct of public participation, with online engagement as one of its core components. The choice of DPP solutions is then left to expert city staff. Oftentimes, the community engagement team itself was created at the same time as the municipal public participation strategy and political request to engage digitally. A proactive investigation of the DPP market through prospective contact, personal contacts, or at professional networking events is followed by the choice to initiate a formal procurement process with a competitive selection process, or a targeted experimental platform adoption outside of any procurement procedure. A set of clear specifications and other requirements (e.g. cost, providers' ethos and reputation) will guide both a procurement and experimental adoption process. Oftentimes, the procurement process is for a package of community engagement and/or urban planning and design services, whereby the platform can also be supplied by a third party planning firm/consultancy. Upon adoption, significant experimentation will characterise the use of the DPPs by the planning organisations (i.e. city agencies and/or consultancies). First time DPP adopters will necessarily face significant experimentation due to the innovative nature and uniqueness of each DPP application, as well as the uniqueness of the urban and planning context(s) for which the DPP is deployed. This can also concern city agencies that adopt a new platform, based on the judgement that the former platform was no longer suitable for their needs. Experimentation will take the form of continuous learning, trial and error, continuous tweaks and improvements to the engagement process and/or technology itself, learning to manage expectations (i.e. from civil society, construction/planning professionals, city staff and politicians), and learning to integrate citizen input in planning workflows.

Figure 44 - Exploratory DPP lifecycle from the perspective of urban planning professionals

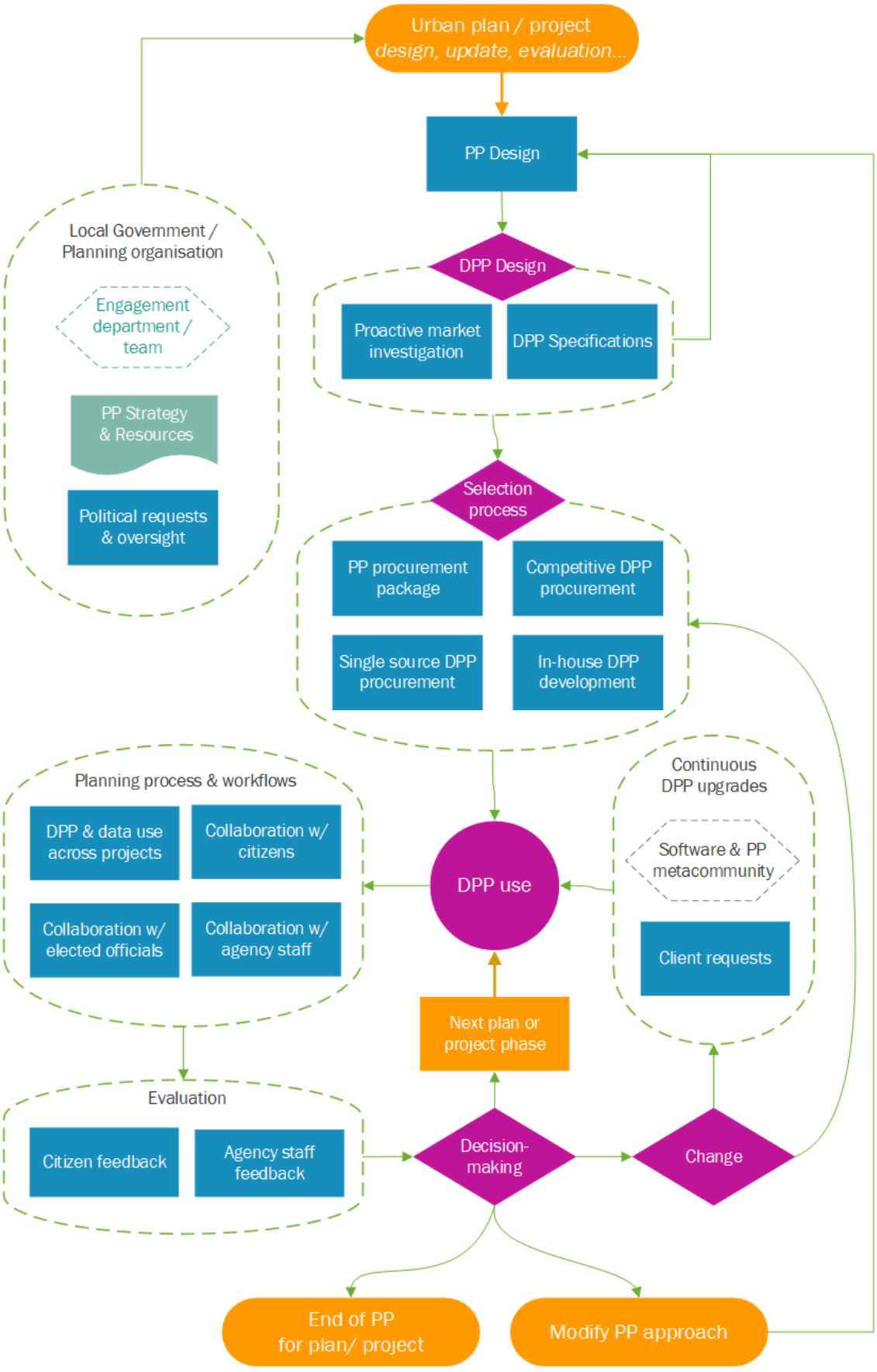
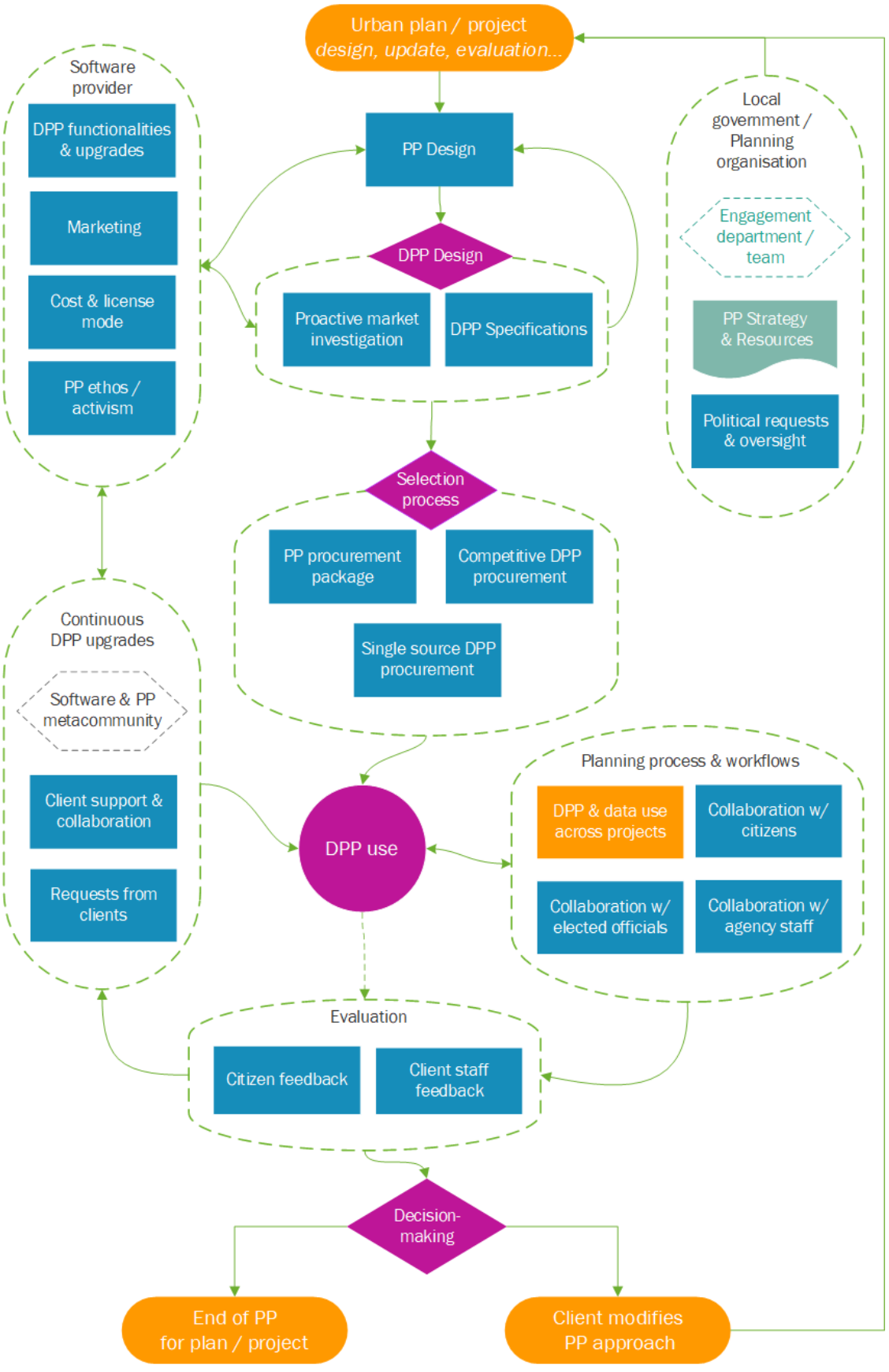


Figure 45 - Exploratory DPP lifecycle from the perspective of software providers



A key innovative, sometimes underestimated dimension is the fact that DPP use and organisational workflows will modify each other recursively over time. As technologies and participatory planning practices are deployed, workflows will most likely evolve as a result, especially if supported by a general will among politicians and city staff to conduct effective community engagement. At the same time, difficulties encountered in the evolution of workflows will likely reveal technological limitations and room for improvements with DPPs, especially if these are first-time applications. Technology and organisational workflows therefore typically seem to evolve simultaneously. Given the relatively fast pace of societal, technological and participatory planning evolutions, evolutions will transpire as distinctly socio-technical. However, the day-to-day reality of DPP innovation shows that the ways these evolutions unfold are not necessarily harmonious or fully synchronised. Managing innovation effectively can require adequate resources *and* resourcefulness (i.e. material resources, PP skills and experience, flexibility and adaptability), and continuous political and staff collaboration. Given the interplay between evolving workflows and technological development, DPP innovation will be enhanced by collaborative relationships between client organisations and software providers, including clear communication, responsiveness and flexibility/agility at all stages of DPP development and implementation. Particularly in an Open Source community model, supportive and collegial relationships between client organisations and platform developers will likely be essential to the effective design and management of DPP innovation. Flexibility in terms of platform architecture may also require the adoption of agile approaches to enable continuous technology development.[54]

DPP use will typically lead to some form of evaluation phase. Engagement summaries for specific planning projects may provide a source of input to this evaluation phase, alongside expert staff's and elected officials' personal observations. Oftentimes, evaluations of the DPPs is not formal, but based on an internally developed checklist of observations and feedback from other staff in the form of discusssions and/or a staff survey. Citizen input may also be involved in assessing the value of the DPP as part of wider engagement process or strategy, for example in the form of an online survey or consultation (e.g. Paris, Boulder). An evaluation phase will typically lead to the renewal of the procurement process, whereby expert staff at planning organisations may decide to leave room for exploring a new DPP solution. Where platforms are developed mostly in-house, evaluation phases may lead to platform upgrades. An evaluation phase can also lead to updating a public participation

[54] Agile project management in the ICT industry is becoming increasingly mainstream in a wide range of organisations, including local and national government (Mergel, 2016).

strategy, developing more detailed PP guidance, and/or rethinking workflows and role distributions collaboratively across the planning organisation.

A new procurement process can lead to the renewal of an existing platform, which may be a preferred default choice for various practical organisational reasons. The procurement process may also be motivated by a clear desire to adopt a new platform.

Where platforms are adopted for a specific planning project or purpose, for example as part of a package of engagement services, the life cycle may be shorter. For example, the use of geoparticipation platforms may be more time-bound and not renewed by procurement processes as would more likely be the case for generalist or participatory budgeting platforms. Where the platform is provided as a Software as a Service license (i.e. unlimited number of projects for a determined duration), satisfactory DPP use may lead to a renewal of the contract. Some municipalities have used the same platforms repeatedly over time for a range of different projects (e.g. Newcastle, Espoo, Jyväskylä, Helsinki, Bristol, Umeå, Paris, Reykjavik).

Taking stock of the hybrid deployment of DPPs as part of ecosystems of tools, one could also explore the life cycle of engagement processes as whole, as well as the life cycle of different ecosystems of tools as part of community engagement strategies. These are somewhat beyond the scope of the thesis due to their complexity and the need for comparative longitudinal analysis, but deserve future in-depth exploration because seemingly not sufficiently covered in the literature.[55]

In all, DPP innovation in the form of socio-technical design, adoption and continuous improvement seems iterative, if not recursive. At multiple stages of the DPP lifecycle lies opportunities for recursive transformations. This seems to contrast slightly with literature that focuses on the path dependency and general resistance of local government to technologies for participatory planning and/or adoption of new technologies. This said, all the use-cases in the thesis are instances where DPPs have been wilfully adopted by planning organisations, and thereby excludes planning organisations for which DPP *non*-adoption is the norm.[56]

Aspects of the life cycle of a DPP echoes slightly with classic examples of technology adoption by corporate and public organisations. Textbook examples of technologies include personal computer technology starting in the 1970s, Xerox in the 1980s, or GIS from the 1980s and 1990s onward (Coppock & Rhind, 1991; Jiří Pánek, 2016). Although beyond the scope of this PhD, some striking

[55] Comparative longitudinal evaluations of specific modes of public participation exist for specific methods (e.g. participatory budgeting, neighbourhood assemblies) but not for ecosystems of tools.
[56] Factors that determine non-adoption require a dedicated investigation beyond the scope of the thesis

similarities may perhaps be found in terms of organisational dynamics and workflows, perhaps at an even faster pace of development.

10.9 Recommendations for practice & design

Having taken stock of the interdependencies between technological, organisational and institutional factors, this section proposes some recommendations for planning professionals and software providers.

With regards to planning professionals, the main recommendations concern organisational capacity and maturity. The first is holistic: the findings in thesis encourage practitioners to make use of every opportunity to create, nurture and harness synergies between the various socio-technical components identified here. The aggregate insight from the 61 use-cases provides evidence to planning professionals and elected officials about the value of making every effort possible to align objectives with realistic levels of influence, organisational and institutional settings, well-designed DPP applications and suitable ecosystems of tools with each other. Put differently, DPPs seem to function best when deployed in ecosystems of tools for engagement and effective communication that are underpinned by clear engagement strategies. Toward this end, adequate resources must be provided for all the practical aspects of DPP innovation, from procurement of the right DPP or sets of DPPs, in-house trained engagement staff, adequate budgets and availability of staff for DPP promotion to feedback provision to the public about the way citizen input has shaped planning processes and decisions.

When adopting DPPs, planning organisations should be aware of preconditions in terms of mature levels of intra-organisational collaboration and communication. At the same time, a trait of DPP innovation in local councils seems to be one of initial and continuous learning. Organisational capacity in the form of collaboration and communication may grow with DPP adoption and use, as DPP back-end interface functionalities can facilitate effective teamwork, project management, data analysis and efficient reporting. At the same time, planning professionals should know that DPPs and their associated participatory planning processes can create additional burden on existing workloads, even after years of use. Evolving uses can create new organisational needs and demands in the form of guidance documents and staff support across an organisation.

Finally, the inherent methodological difficulty in evaluating DPPs and the wider participatory processes in which they are embedded should not deter practitioners from the attempt. Appropriate DPP application design by platform administrators and supporting data analytics can help paint a better picture of who the participants are on the DPP. This is key to establishing the levels of representativeness of participation on digital platforms, in complement to other quantified measures

such as: number of participants, number of comments per participant, number of endorsements/likes, and so on. Besides those essential, 'low-hanging' metrics of participation that can be obtained via the platform itself, the most effective evaluations of DPP also rely on citizen appraisals as part of a mixed methods evaluation approach. Only few city agencies conduct digital participatory appraisals *about* completed digital participatory processes. Supporting evaluation methods include in-person and telephone surveys that are statistically significant. In participatory processes as in participatory evaluations, mixed mode surveying can enable the best of several worlds: quantity, quality and representativeness. This notion of mixed mode or mirrored surveying was advocated by several established software providers (e.g. *Neighborland*, *Commonplace*, *Bang the Table*, *Cap Collectif*). In the final analysis, however, the aim of DPPs proper is mass participation grounded in principles of transparency and creativity of expression, rather than representativeness per se.

As for software providers, the main findings corroborate software companies' current emphasis on improving workflow integrations instead of tackling new alluring digital horizons, such as Augmented Reality or Virtual Reality. The dream of Augmented and truly virtual forms of mass participation still seem remotely accessible, considering the number of years that has lapsed since they have first been envisioned (Cirulis & Brigmanis, 2013; Marcus Foth et al., 2009; Hanzl, 2007; Portman et al., 2015). Instead, the back-end data management and design tools can benefit from continuous improvements to better meet the needs of planning professionals in client organisations. Additionally, client support responsiveness in times of technical difficulties seem an important factor for long-term trust on the part of clients. Given that the DPP market is growing fast, the early pioneers in the field need to adapt to the new wide range of both multifunctional and specialist applications, some of them being Open Source applications with their dedicated and growing meta-communities of practice (e.g. Metadecidim[57]). The strength of DPPs could further grow in its capacity to coordinate and interlink with traditional in-person engagement methods. Efforts to further synchronise and make synergies between digital and physical modes of participation could further reduce engagement and digital divides, and associated effects of social and political marginalisation.

[57] https://meta.decidim.org/

11 Conclusions

11.1 Introduction

Digital technologies of relevance to urban planning come in many shapes and forms. This thesis has investigated the use of digital participatory platforms (DPPs) in urban planning to gain a greater understanding about their socio-technical hybridity and help fill corresponding gaps in empirical evidence. Although the literature commonly acknowledges a range of socio-technical factors that influence the use of DPPs in urban planning, this thesis identifies an important empirical gap in knowledge about both the range and diverse uses of different platforms. The findings and discussions in the thesis are based on much-needed and previously-lacking empirical data.

The research design is framed around the following six research questions.

- **RQ 1** Which objectives for public participation do DPPs enable?
- **RQ 2** Which levels of influence on urban planning decisions do DPPs enable?
- **RQ 3** Which technological features on DPPs are perceived as most useful?
- **RQ 4** How do DPPs complement other tools for public participation?
- **RQ 5** Which main organisational and institutional factors affect the adoption and use of DPPs in urban planning?
- **RQ 6** How can the use of DPPs be theorised to better reflect their hybrid use in urban planning?

The first five research questions are primarily empirical in nature. Building upon these, RQ6 attempts to utilise the findings about the observed socio-technical hybridity of DPPs to develop a corresponding theory of DPP hybridity to improve their conceptualisation and utilise their full potential to further support ongoing processes of participatory planning innovation. The chapter summarises the gaps in knowledge and the key findings by way of the research questions. The chapter then highlights the main contributions to knowledge for the thesis, and concludes by providing cues for future research.

11.2 Objectives for public participation

RQ 1 Which objectives for public participation do DPPs enable?

While the literature on digital participation recognises that DPPs can be used for different purposes, empirical data is lacking about the stated objectives of public participation for a broad range of DPPs used in a variety of planning contexts. The findings main indicate that the objectives for public participation via DPPs are multiple, contextually-relevant, and should be aligned with realistic levels of influence to safeguard public trust and transparency in planning processes. Both planning professionals and software providers highlight that it is less the tools themselves that mediate particular objectives, but the use-contexts, engagement strategies, and engagement needs of planning

organisations. As such, the objectives for using DPPs also concern to the use of ecosystems of tools for public participation. Therefore, engagement objectives cannot be attributed to DPPs alone. Regarding specific objectives on the IAP2 Spectrum of Public Participation, research participants display a diversity of uses and understandings of the different categories. Information, rather than being a 'low-hanging' fruit on analytical models of public participation, is a fundamental prerequisite and enabling factor of other objectives. According to the, objectives for the use of DPPs seems to lie primarily along the range 'Consult', 'Involve' and 'Collaborate', depending on the type of urban planning project. Empowerment in the form of power delegation may exceptionally take place (e.g. for the voting phase in participatory budgeting). More commonly, DPPs can enable some levels of shared decision-making.

11.3 Perceived influence on planning decisions and processes

RQ 2 Which levels of influence on urban planning decisions do DPPs enable?

The perceived influence on planning decisions is often articulated by way of engagement objectives. Furthermore, a direct influence on planning decisions is difficult to attribute to DPPs alone. This is due to the nature of urban planning processes that require the consideration of multiple data points, including but not limited to multiple forms of citizen input. As DPPs are best utilised when deployed as part of ecosystems of tools, isolating the influence of each tool presents inherent methodological difficulties, given the complex nature of social environments. DPPs' influence on planning is also best articulated in terms of both processes and outcomes. The real influence of DPPs may accrue in the long-term and therefore beyond the duration of individual online engagement projects. Factors that influence DPPs' influence include the depth of participation (e.g. quality of citizen input), the breadth of participation (e.g. its representativeness, the diversity of views expressed), and related institutional factors such as trust in local government, engagement divides, digital divides, and professional and citizen views about DPPs. DPPs' influence on planning also relates to organisational workflows, namely the manner in which planning professionals design digital participation a and have the capacity to utilise citizen input.

11.4 DPP Features

RQ 3 Which technological features on DPPs are perceived as most useful?

Concerning technological features on DPPs, the literature lists typical ranges of functionalities (Afzalan & Muller, 2018; Falco & Kleinhans, 2018b; Gün et al., 2019). Few of these are empirical in nature, however. From the analysis of the empirical data, the most important technological features for end-users (i.e. citizens) relate to 2D and 3D geoparticipation, dialogical functionalities, usability, scalability, and flexibility (e.g. level of customisability). Besides end-user functionalities, the back-end data management and design tool is essential to optimise DPPs' integration in planning

workflows. Continuous improvements seem required to further utilise the data management capacities of DPPs, as indicted by both planning professionals and software providers.

11.5 DPPs within ecosystems of tools

RQ 4 How do DPPs complement other tools for public participation?

The literature widely acknowledges the fact that digital tools cannot replace more traditional forms of public participation. However, empirical knowledge about the manner in which DPPs actually complement other tools is scant, as the literature mostly focuses on individual technologies. The thesis stresses that DPPs are best used as part of *ecosystems* of public participation. Their main strengths as tools and methods of mass participation are best utilised when combined with a variety of complementary in-person and physical methods of communication and public participation. These help to address issues related to entrenched engagement divides and digital divides which may affect already-marginalised groups of citizens most severely. Tools that commonly complement DPPs include social media, various forms of street level outreach, events and fairs in public space, and planning workshops. The findings from both software providers and planning professionals also indicate opportunities synergies between digital and in-person tools. These require innovative uses of both types of tools, which could be best achieved by considering the use of tools as part of methodologies and elaborate engagement strategies. This still underdeveloped aspect of DPP innovation promises to release engagement synergies via complementary approaches such as mixed modes, mirrored engagement, and continuous approaches to engagement. The most innovative use of DPPs indicate *recursiveness*, that is: the capacity for digital and in-person methods to structure each other and determine each other's content.

11.6 Organisational & institutional factors

RQ 5 Which main organisational and institutional factors affect the adoption and use of DPPs in urban planning?

The literature provides extensive reviews of the factors that can influence the uptake and use of DPPs in urban planning. However, as with the other domains of enquiry, empirical evidence is scant concerning the range of DPPs and use-contexts considered in the thesis. The main organisational and institutional factors concern procurement procedures, engagement needs, political will and support, engagement skills, staff availability, and intra-organisational and citizen attitudes toward DPPs and participatory planning practices. Related to the above, the capacity to learn, experiment and innovate will likely determine both the extent to which DPPs are used by planning organisations, and the quality of the participatory processes. In turn, this will influence the manner in which citizen input influences planning decisions. A key finding is that the use of DPPs is both influenced by and actively contributes to reshape planning processes and workflows.

11.7 DPP hybridity

RQ 6 How can the use of DPPs be theorised to better reflect their hybrid use in urban planning?

Although the socio-technical nature of DPPs is recognised in varying degrees in the literature, their theorisation remains limited and centred around aspects of usability and planning process integrations. Building on the findings, including the interdependencies between the different investigated themes, this thesis addresses important gaps in relation to understanding the hybrid uses of DPPs in urban planning. In particular, it establishes the importance of the socio-technical hybridity of DPPs. This multi-layered hybridity translates empirically as the combination of digital with physical and in-person methods for public participation, the bridging of different types of knowledge, and the mutually-shaping processes of technology use and participatory planning practices. Not only do planning processes and workflows influence the adoption and use of DPPs, DPPs actively contribute to modify these through their collaborative and participatory affordances, and through the innovative ways in which planning professionals apply them to different planning contexts. In turn, the use of DPPs creates new organisational and institutional needs. This dual process of technology use and evolving processes and workflows is not only iterative, it also seems recursive. The very existence and development of DPPs seems predicated on this socio-technical process of innovation. DPPs, therefore, are best considered as hybrid systems. As such, they can be reframed in terms of the hybrid ontologies ('ways of being') that they represent and corresponding epistemologies ('ways of knowing') that they facilitate. In all, a theory of DPP hybridity deserves further testing and operationalisation in future research

11.8 Contribution to knowledge

This thesis makes substantive contributions to knowledge through a qualitative meso-level investigation that considers a wide range of DPPs across varied planning contexts distributed across Europe, North America and Australia. The thesis thereby provides much needed and previously lacking empirical data alongside avenues for new theoretical development about the socio-technical hybridity of Digital Participation Platforms (DPPs) within urban planning. Prior to this research, only few empirical studies undertook a meso-level investigation of DPPs within urban planning and no studies explicitly investigated the complementarity between DPPs and other tools for public participation across a wide range of planning contexts and platform types in an international perspective. The thesis has contributed to fill gaps in empirical knowledge around the five key themes of enquiry relating to DPPs in urban planning. Beyond the substantive empirical and theoretical contributions, thesis also presents a significant methodological contribution to the field. Furthermore, few if any studies seem to have considered the views of software providers and integrated these with views of planning professionals to provide a more holistic view. Upon that basis, the thesis has been

able to provide an overarching theorisation of the use of DPPs in urban planning that fully takes stock of the hybridity and interdependencies between the main sets of socio-technical issues. Additionally, an exploratory DPP life cycle has been established that serves to further illustrate the manner in which socio-technical hybridity manifests over the life course of a DPP. The combined aforementioned contributions have also enabled to provide original recommendations to planning professionals and software providers about how to best utilise DPPs' inherent hybridity. It has also provided important avenues for future research to further operationalise innovative ways of investigating DPP hybridity.

11.9 Future Research

In answering the research questions about Objectives for public participation, DPP features, and Tool ecosystems, the discussion of the findings indicate a number of remaining research gaps. First, the objectives for public participation seem highly contextual both in terms of planning context and practitioners' perspectives. The IAP2 Spectrum yields a variety of responses, and it is sometimes unclear how the upper levels of the Spectrum (i.e. consult-empower) can be differentiated in the practice of digital participation. Mixed methods research that uses in-depth case studies, Delphi methods, and statistically significant surveys could help investigate the validity, reliability and contextual meanings associated with the different categories on the IAP2 categories across a range of DPP use-cases. Specific constructs, mediating variables, and moderating factors could help identify and map how and why practitioners select particular engagement objectives for DPPs. The latter requires a consideration of the organisational and institutional factors discussed in the next section. Future research could also investigate which alternative model(s) of digital participation (or public participation) might be more valid. Examples of models mentioned in the findings include the city of Longmont's (CO, USA) consistent use of the Levels of Community Engagement, which was developed internally by the city agency as a pragmatic alternative to the IAP2 Spectrum. In a French context, a similar mixed methods approach could be tested for the widely used pragmatic engagement model developed by the government agency ADEME (2016). The latter research could also incorporate a critical pragmatic approach, following Davis and Andrew (2018) to better consider organisational and institutional opportunities and hurdles to an effective implementation of engagement objectives.

Concerning DPP features, more empirical research is needed about success factors for the adoption and use of DPP features, including inherent problematics to determining what 'success' might be in terms of objectives and technological efficiency. Participant observation and closer collaboration between planning professionals and software providers could help identify specific opportunities to improve back-end data management features. As appropriate, summative usability testing and/or wire-framing could begin to augment empirical knowledge and guide product upgrades. Avenues for the

creation and improved use of dialogical functionalities also require investigation. Finally, mixed methods and longitudinal case-studies could also explore the use of ecosystems of tools, rather than individual tools, with a view to inform synergetic uses of DPPs as methods embedded in comprehensive engagement methodologies.

Finally, the findings and literature highlight that the use of DPPs in inseparable from their organisational and institutional use-context. However, more empirical research is required to systematically assess DPPs' influence on both planning decisions and processes, notwithstanding the practical and methodological challenges toward this end. Assessors and researchers should not shy away from context-sensitive evaluation frameworks if these are consistent, systematic and are clearly communicated among all interested parties/stakeholders. Just like DPP solutions, it does not seem that a 'one-size-fits-all' approach to the evaluation of DPPs will ever be successful. Unless consortiums of leading public organisations and think thanks develop a type of 'ISO' standard for community engagement. However, given that social environments are more difficult to quantify and assess than industrial processes, it is unlikely that comprehensive assessments of DPPs will ever stretch beyond principle-based recommendations. In sum, more empirical research is needed to understand which arrangements of DPP use and evaluation seem to function best in ways that are context-sensitive enough to be applied elsewhere, and generic enough that they could be adapted anywhere else. The latter research should be combined with that suggested at the end of Chapter 2 regarding engagement objectives, DPP features and ecosystems of tools. Mixed methods research would enable to draw in-depth and more representative insight from existing use-cases of DPPs in urban planning. In terms of in-depth inquiry, participant observation conducted through shadow working across multiple organisations could help shed valuable insight about the organisational and institutional opportunities and challenges faced by practitioners in planning organisations and software companies. A good methodological template for such ethnographic practice-based research is provided by Escobar (2014), which and can also draw inspiration from the influential work by Flyvbjerg (2002, 2006). In particular, the literature about the day-to-day experience of staff working at DPP software companies seems much scant than it is for planning professionals, which itself is rather limited. On the meta-survey side, noteworthy attempts to develop an overview of the usefulness of DPPs and challenges faced by planning professionals in US cities includes Afzalan (2015). The mixed methods approach adopted by the latter author could be up-scaled to consider use-cases in other countries as well as DPP software companies.

12 Appendix I – Models of Public Participation

This Appendix provides a summary of twenty influential models of public participation that have helped to shape the research design of the thesis. The review of the models, alongside the review of the models of digital participation, enabled to make an informed choice about which models to utilise in the research. These complement the four models in Chapter 2 of the State-of-the-Art.

12.1 Ladder of Empowerment

The Ladder of Empowerment by Rocha (1997) relocates the notion of empowerment in terms of two dimensions that are often missing in public participation typologies: i) participation that ranges from individualistic to collective/community empowerment, and ii) the corresponding level of political empowerment. While empowerment is considered from a multiplicity of perspectives in competing models of public participation, the political and aggregate levels of participation are seldom addressed as explicitly as within the Ladder of Empowerment. Several non-hierarchical frameworks and research agendas that focus on the socio-technical opportunities engage with these issues cogently[58]. A possible limitation of the Ladder of Empowerment would be one perspective, in that the adoption of online technologies and related socio-cultural lifestyles are characterised by highly individual(ised) forms of user participation and interaction. Particularly in the case of Civic Tech technologies, these enable the mass participation of individuals (Brabham, 2009), which can, depending on design and institutional/governance arrangements, yield tangible political outcomes on a large scale, and at all stages of a planning process (Kahila-Tani, 2015). From the perspective of current innovations in participatory online technologies, therefore, the Ladder of Empowerment could potentially be redesigned as a wheel, or even as a spiral based on Fibonacci numbers, to indicate a more circular or recursive pattern, respectively.

The ladder of empowerment is gradated according to a scale of empowerment, from the rational, psychologically-motivated individual (atomistic individual empowerment) to the meta-community level of formal political engagement (political empowerment).

[58] Both of these aspects are explicitly relevant to the thesis, as addressed in the discussion chapters. Civic tech platforms typically engage citizens on an individual basis, and the political outcomes of such framed online public participation are addressed in the next two chapters of the Literature review. See the third chapter in the Literature Review for a review of socio-technical factors affecting the uptake and use of digital participatory platforms. Unfortunately the article by Rocha (1997) is inaccessible due to limited university library online subscriptions and unavailability from other online sources.

The Ladder of Empowerment brings into question the authoritative professional knowledge of planning: Whose and what kind of knowledge really matters or should matter? As planners's professional knowledge may be pitted against that of communities and individuals, consequences for the empowerment of citizens may take expression through the different rungs of the ladder. Particularly in urban planning where the 'client-provider' relationship between citizens and planners is unlikely to disappear, it is essential to consider the empowerment outcomes of planning practices. Instead of a dichotomy between professional and community knowledge, Rocha (1997) emphasises instead their dialectical relationship, in particular the need to combine both.

Recognising the value of multiple forms of knowledge from the lens of empowerment, in turn, amounts to fostering pluralism in planning (Davidoff, 1965; Lane, 2005) as well as in the wider arena of democratic politics (Mouffe, 1999). Managing pluralism, however, is a necessarily contentious process, particularly as regards the legitimate use of space in cities (Dikeç, 2012; Smith, 1996).

There are inherent limitations to scalar or sequence-based assessments of empowerment, however. Whereas Rocha (1997) locates empowerment from the perspective of the individual, and sequentially moves up to the penultimate empowerment level of politics, Friedmann (1992, cited in Elwood, 2002) portrays effective psychological empowerment as the result of social or political empowerment. Elwood (2002, p. 909) suggests instead that psychological experiences and processes of empowerment are more ambiguous and cannot neatly fit gradated categorisations. Rather, empowerment can be viewed in substantive rather than in scalar terms. Particularly, empowerment can be seen as a multi-dimensional phenomenon. For example, empowerment can be analysed by considering complementary dimensions such as *distributive change*, *procedural change* and *capacity building*. Distributive change can be described as improved access to goods and services, as well as increased opportunities to partake in participatory planning. Such change typically focuses on tangible outcomes. Procedural change relates more to process, such as greater inclusiveness in decision-making, and more legitimate means of engagement. Capacity building denotes individuals' and communities' ability to act on their own behalf. The broad literature on capacity building covers such diverse aspects as developing political awareness; acquiring skills that enable people to address socio-economic inequalities or exert greater control over their living environment; and gathering information about existing conditions as a basis for remedial action (Elwood, 2002). Looking at empowerment from multiple angles simultaneously can help overcome a reification of scale, while at the same time remaining closely attentive to the role of scale in the complex interactions between individuals and institutions. Community groups, especially, engage in multiple spheres of interaction *simultaneously*, from the community/neighbourhood to the political level. The empowerment aims of individuals and community groups are also typically multi-dimensional, and can hardly be subsumed

to either distributive change, procedural change or capacity building in isolation of the other two related empowerment dimensions (Elwood, 2002).

12.2 Arnstein Gap

The Arnstein Gap (Bailey & Grossardt, 2010) aims to address the lack of direct measurement tools of public involvement in transport infrastructure. Based on the Ladder of Participation (Arnstein, 1969), it measures the deficit in the quality of public participation by contrasting perceptions of the status quo with a desired state, expressed as an objective or in the form of a diagnostic evaluation. While helpful operationalise the Ladder of Participation, the Arnstein Gap cannot do away with the value-laden categorisations of the Ladder, which make it a tool for critical evaluation by policy analysts rather than a pragmatic design and implementation tool for planning professional working in the public or private sector.

12.3 Level of Participation

Wilcox (1994) proposes a typology of levels of participation aimed at practitioners which relates to the overall degree of citizen control. The most relevant level of participation is based on suitability rather than normative goals. The levels are: 1) informing; 2) consultation; 3) deciding together; 4) acting together; and 5) Supporting independent community interests. The levels of participation differ from Arnstein's Ladder of Participation in that it features community self-organisation as the penultimate level of participation, rather than citizen control of institutional decisions. The discussion of the levels of participation is part of a ten-point recommendation for the design and implementation of effective participatory processes, which are discussed further in the section on socio-technical factors. In a nutshell, the stated goal of public participation must match with the organisation's capacity to deliver so as not to make false promises to the public and generate disillusionment. Effective participation hinges on adequate preparation in organising and clarity in communication about the participatory process.

12.4 New ladder of citizen participation

Connor (1988, p. 252) provides a "New Ladder of Participation" to better align participation goals with planning needs. The perspective, however, is the reverse of Arnstein's Ladder of Participation: it focuses on planners rather than citizens. Its purpose is to "provide a systematic approach to preventing and resolving public controversy about specific policies, programs and projects whether in urban, suburban or rural settings and whether governmental or private sector in sponsorship." (Connor, 1988, p. 250).

The first six rungs contribute cumulatively to the seventh rung, which is the ultimate goal of resolving public controversy. There is no recipe to successful controversy prevention or resolution: depending

on context, several mechanisms may need to be applied simultaneously. Because "resolution/prevention" implies the absence of opposition, it adopts a more negative approach than many other spectrums of participation. Mediation, and especially litigation, are best conceived as last resort. (Connor, 1988).

12.5 Public participation ladder

Wiedemann and Femers (1993) developed the Public Participation Ladder to aid with the analysis and management of conflicts in contentious planning contexts. Its categories are: 1) public right to know; 2) informing the public; 3) the public right to object; 4) public participation to define interests and determine the agenda; 5) public participation in assessing risks and recommending solutions; and 6) public partnership in final decisions. Individual cases can match multiple levels of public participation. They also identify four steps in conflict management: i) defining issues and outlining options; ii) choosing decision procedures and critiria; iii) assessing options and choosing the "best" one; and iv) implementing the decision. The underlying assumption behind the ladder is that public participation can generate as much conflict as it can solutions to complex planning situations. Furthermore, they argue that many assumptions about the value of public participation in spatial planning are insufficiently grounded in empirical research, although they fail to mention that some of the most influential models such as Arnstein's (1969) Ladder of Participation were developed in conjunction with substantial case study analysis. Wiedermann and Femers apply their model to 4 waste management case studies. Their ladder differs from other ladders that focus on conflict management and resolution (e.g. Connor's (1988) New Ladder of Citizen Participation) in that it focuses on the most appropriate level of public participation without mention to mediation and litigation as possible courses of public action. Interestingly, Wiedemann and Femers (1993) do not cite Connor (1998) or Arnstein (1969) in their paper. Their Public Participation Ladder perhaps emphasises the role public participation more proactively, while Connor's New Ladder of Citizen Participation focuses more on preventive and legalistic modes of conflict management and resolution.

12.6 Typology of public participation

Pretty (1995) is slightly modelled on Arnstein's (1969) Ladder of Participation,. Its categories are: 1) manipulative participation; 2) passive participation (where decisions have already been made and further input will not be considered); 3) participation by consultation (where organisation are not bound to make use of the participation input); 4) participation for material incentives; 5) functional participation (to achieve desired goals, especially by reducing costs) 6) interactive participation (featuring joint analysis and development of plans and local institutions); and 7) self-mobilisation supported by external organisations. Pretty applied the ladder to rural agricultural contexts. The ladder rests on a promotion of iterative social learning about resource management and collaboration across

stakeholders and institutions. It also recognises that participation does not necessarily lead to sustainable outcomes and proposes a set of reflexive trustworthiness criteria that can support the joint production of reliable knowledge that is not grounded purely in a positivist paradigm. Interestingly, the highest level of participation points to community *self-organisation* ('self-mobilisation' in the actual typology), which distinguishes the typology from the majority of models reviewed here that focus on institutional empowerment *within* rather than outside of local government. Several models for digital models of public participation reviewed below adopt a similar approach to viewing community self-organisation as more empowering than community influence on institutional decision-making.

12.7 The Split Ladder of Participation

Hurlbert and Gupta (2015) propose a "split ladder of participation" based on Arnstein's (1969) Ladder of Participation to help design and assess public participation for a range of policy problems. It is a split ladder distributed across four quadrants, structured based on: i) 4 four ideal policy problem types (from unstructured to structured); ii) levels of collective learning required to make sense of complex planning situations; iii) corresponding goals of stakeholder participation; iv) and levels of trust, certainty about policy situations, and prevailing institutional value types. It is anchored in a social learning framework that ranges from single loop, learning characterised by one-way communication, to triple-loop learning for complex unstructured policy problems. The authors applied the split ladder to rural water governance contexts.

12.8 Ladder of public involvement

Dorcey et al.'s (1994) Ladder of Public Involvement emphasises different stages in a planning process rather discrete approaches to public participation, and is perhaps less hierarchical or normative than other models such as Arnstein's Ladder of Participation. The levels are: 1) inform; 2) educate; 3) gather information and perspectives; 4) define issues; 5) consult on reactions; 6) task ideas and seek advice; 7) seek consensus; and 8) ongoing involvement.

12.9 Matrix of Public Participation

Schlossberg and Shuford (2005) designed the Matrix of Public Participation to aid in the evaluation and design of participatory processes, especially Public Participation GIS (PPGIS). It builds on a review of several public participation models reviewed here, including by Arnstein (1969), Connor (1988), Widemann and Femers (1993), Dorcey et al (1994), and Mitchell (1997), amongst others. The rows of the matrix can feature different goals/levels of engagement, as per chosen public participation model, or it can list different engagement tools and methods, as appropriate for a particular planning context. These are listed on a spectrum ranging from simple (e.g. "inform") to complex ("citizen control") .The columns of the matrix list the "domains of the public", namely the range of

stakeholders that will take part in the participatory process: i) decision-makers; ii) implementers; iii) affected individuals; iv) interested observers; v) random public. Likewise, the range of stakeholders is also listed along a spectrum from simple (e.g. decision-makers) to complex (e.g. random public). The matrix boxes can also be filled with concise descriptive comments pertaining to the matching goals or techniques and stakeholder groups. While developed for retroactive or diagnostic evaluation purposes, the Matrix of Public Participation could also be used for planning and designing projects upstream from implementation. Particularly, it can help benchmark the goal and keep track of target audiences for different participation goals and tools/methods.

12.10 Cube of Engagement / Democracy Cube

Fung's (2006, p. 71) Cube of Engagement, also named the Democracy Cube, rests on the core assumption that context matters, and that public participation can take on a plurality of forms in a non-prescriptive manner:

> "There is no canonical form of direct participation in modern democratic governance; modes of contemporary participation are, and should be, legion" (Fung, 2006, p. 66)

While many of the assessment frameworks for public engagement are two dimensional, Fung (2006) proposes to locate public engagement mechanisms along three axes: i) the scope of participation (i.e. *who* participates); ii) the communication and decision mode (i.e. *how* people participate); and iii) authority and power (i.e. *how much influence* is exerted by participants). The Cube enables to locate how particular public participation techniques relate to these three connected dimensions. Locating techniques in the model therefore produces three dimensional volumes that stretch differently along the three axes as relevant per individual public participation technique.

The Cube of Engagement enables to locate varieties of institutional design choices that build on citizen engagement. The assessment framework measures the intensity of the three dimensions of governance as highest where the three axes meet: technical expertise, expert administration and direct authority display the highest degree of participation. Rather than focus on expert decision-making and expertise, the diagram aids in assessing how participatory institutional design choices problems can solve governance problems. Fung (2006) articulates three main dimensions to contemporary complex governance: legitimacy, justice and effectiveness. Legitimacy refers here to whether public policies are broadly supported and obeyed by citizens. Justice relates to political inequality and decision-making practices that favour the few over the many, and their effects for affected groups of citizens. Effectiveness relates to public action or policy-implementation. Even where public decisions may be just or fair, public agencies may lack the means to implement them effectively. Citizens can also become active in public service delivery: "In the provision of public services such as education and human development, for example, the involvement of clients in coproduction may dramatically increase the quality of some services" (Fung, 2006, p. 73).

Participatory designs seldom address legitimacy, justice and effectiveness of governance simultaneously. For instance, participatory budgeting experiments in Porto Allegre from the early 1990s onward mostly improved justice by shifting decision-making away from corrupt practices of clientelism to shared decision-making that involved those communities most in need of public investment. The outcomes of the process were improved living conditions for the involved communities (Fung & Wright, 2001). In terms of the Cube of Engagement, Fung (2006) locates this example of participatory budgeting as an open form of participation with targeted recruitment. Development preferences are aggregated and bargained. The process relies on the voice of the poor to be represented in the process, rather than on actual deliberation mode that involves everyone concerned. Justice in the Porto Allegre was only improved because the involved communities have direct authority over decisions. Due to the corrupt governance networks formerly in place, advisory recommendations would not have been sufficiently to tilt the decision-making balance in favour of the poor majority (Fung, 2006). It can be added that redressing justice probably made decisions more legitimate as well. As a public engagement mechanism focused on shared decision-making, participatory budgeting schemes do not address effectiveness of implementation as such. In sum: "particular designs are suited to specific objectives" (Fung, 2006, p. 74).

The Cube of Engagement stands in sharp contrast with Arnstein's (1969) Ladder of Participation. Its aim is to assess the complementarity of citizen participation within institutional practices rather than the degree of citizen control:

> "Mechanisms of direct participation are not (as commonly imagined) a strict alternative to political representation or expertise but instead complement them… Public participation at its best operates in synergy with representation and administration to yield more desirable practices and outcomes of collective decision making and action." (Fung, 2006, p. 66).

The Democracy Cube is imbued by Fung & Wright's (2001) model of Empowered Deliberative Democracy (EDD). Based on the analysis of five international examples of local governance reform, their model for deepened democratic practices emerges from three main principles: i) practical orientation; ii) bottom-up participation; and iii) deliberative decision-making/problem-solving. These three principles find their expression in three related design properties: i) devolved/localised decision-making structures; ii) centralised supervision/coordination of grassroots decision-making; and iii) state-centred governance reform rather than short-term community activism. The underlying assumption to the EDD model is that effective public engagement mechanisms become embedded in existing institutions through reform.

12.11 Stages of public involvement

Jackson (2001) proposes 5 stages/objectives of public involvement that build on Arnstein (1969) and Dorcey et al. (1994): 1) Informing stage (to raise awareness and generate interest before any planning

process; 2) educating the public (which functions best on a personal basis rather than through mass advertising); 3) testing reactions (through more personal and less formal methods than open public meetings); 4) seeking ideas and alternative solutions; and 5) seeking consensus. These 5 stages are preceded by a phase of identifying all relevant stakeholders. The stages are meant to guide practitioners in designing and implementing effective participatory processes. They stretch across a continuum of involvement comprised of one-way communication ("informing the public" stage), two-way communication ("testing ideas" and "seeking alternatives" stages) and shared decision-making ("seeking consensus" stage). The stages are further developed into a matrix with four fields to aid practitioners in planning, designing and implementing participatory processes: 1) the objective of public involvement; 2) stakeholder identification and main requirements for effective involvement; 3) "when to use"; and 4) "not appropriate for". The matrix is the product of 50 personal interviews with stakeholder participants and organisers from 8 completed participatory processes.

12.12 Public participation choices in policy

Bishop and Davis (2002) indicate that the choice of public participation methods depends on the stated goals, political context, issues being debated, and the actors involved. They further argue that "consultation is only participation when information gathered can influence subsequent policy choices" (P. Bishop & Davis, 2002, p. 27). They base their model on Arnstein (1969) and Shand and Arnberg (1996:21). These are: 1) consultation; 2) partnership; 3) standing; 4) consumer choice; 5) control. They provide the different choices for public participation as discrete and different objectives, rather than as a ladder or spectrum/continuum of public participation. They articulate these choices as a Map of public participation choices that associates participation type with objectives, key instruments and observed limitations. As such, their model is predominantly pragmatic, for use by practitioners.

12.13 Mosaic/scaffold of user involvement

Tritter and McCallum (2006) propose a multiplicity of ladders or a mosaic analogy to the evaluation of different forms of end-user involvement in public service assessment. Their discussion of the limitations of Arnstein's (1969) Ladder of Participation is grounded in an evaluation of user involvement in the National Health Service (NHS) in the UK. Although they do not provide any diagrammatic alternative, they suggest that multiple ladders, a scaffold, or a mosaic approach would be more adapted to designing, promoting and assessing different modes of user involvement. Summarising some of the main issues they address:

> Developing and applying a more realistic model of user involvement requires a move beyond the dichotomy of representative versus other, inclusion versus exclusion that are Arnstein's focus. Instead, a variety of involvement methods that tap into complementary communities of users, draw people at different points in their life, illness or care pathway is required to ensure relevance for

> different types of user involvement. Effective user involvement must be founded on connections to a multiplicity of individuals and groups and the integration of one-off and more continuous involvement Arnstein's ladder – fails to capture the dynamic and evolutionary nature of user involvement. Nor does it recognise the agency of users who may seek different methods of involvement in relation to different issues and at different times (Tritter & McCallum, 2006, p. 165).

Although centred on user involvement in healthcare, their discussion arguably has implications for other domains of user participation in society. Their discussion of the numerous key factors affecting the design and evaluation of user involvement would further benefit from a tentative diagrammatic fleshing-out so as to guide both research and practice. While leveraging important criticism of the shortcomings Ladder of Participation, Tritter and McCallum (2006) do not discuss possible institutional barriers to implementing the flexible, user-centric type of user involvement they advocate in any great detail.

12.14 Typology of interests

White (1996) developed the Typology of interests to help consider the diversity of forms, functions and interests in the catch-all notion of "participation". She considers four main forms of participation: 1) nominal participation, which equates with legitimation of projects and the inclusion of community views, and functions as "display"; 2) instrumental participation, which functions as a "means" to an end by improving the efficiency of projects for organisations and reducing participation costs for local communities; 3) representative presentation, which safeguards the sustainability of projects and secures the voice of communities; and 4) transformative participation, which is associated with empowerment of communities both as a means (or process) and as an end (or goal/outcome). Interestingly, empowerment as a process "never comes to an end, but is a continuing dynamic which transforms people's reality and their sense of it." (White, 1996, p. 147). White further illustrates how these different, inherently political dimensions of participation play out in various development contexts. White (1996, p. 1545) also highlights that participation seldom comes without conflict:

> If participation means that the voiceless gain a voice, we should expect this to bring some conflict. It will challenge power relations, both within any individual project and in wider society. The absence of conflict in many supposedly 'participatory' programmes is something that should raise our suspicions. Change hurts. Beyond this, the bland front presented by many discussions of participation in development should itself suggest questions: *What interests does this 'non-politics' serve, and what interests may it be suppressing?* [emphasis added].

Falsely portraying participatory processes as "non-political", therefore, could be a deeply political way of obscuring existing potential imbalances in power.

12.15 Social learning as a policy paradigm

Building on P. Bishop and Davis (2002), Collins and Ison (2006) propose social learning as a paradigm for policy development. They contend that social learning functions best in situations

characterised by high levels of: i) interdependencies between different factors; ii) complexity; iii) uncertainty; and iv) controversy.

In critiquing the linearity of many public participation models which also affects Bishop and Davis's own typology (2002), they suggest instead that:

> …it is in the process of participation that the nature of the policy issue is determined, thus shaping the nature of the participation process itself. The linear conceptualisation of participation does little to emphasise the importance of either the process or the existence of feedback loops (2006, p. 4).

They add that social learning can function as an emerging governance mechanism that can enable concerted action between diverse stakeholders. This requires moving beyond framing participation exclusively in terms of power, which will necessarily constrain the way supporting participatory techniques are used. Their discussion is grounded in the analysis of European water governance project.

12.16 Typology of public engagement

Rowe and Frewer's (2005) typology of public engagement emerged from an attempt to classify competing and often contradictory conceptions of public engagement mechanisms. Different mechanisms are often labelled with the same term, while similar mechanisms are described using different terms. Important differences in term usage can arise across different contexts, such as different countries (e.g. US vs. UK). To remedy such confusion in the public engagement nomenclature, Rowe and Frewer (2005) propose a typology based on the degree of information flow. They classify public engagement mechanisms along three main lines:

1. **Public communication**: one-way information flow from sponsor to public representatives
2. **Public consultation:** one-way information flow from public representatives to sponsors
3. **Public participation**: two-way information flow between sponsors and public representatives

As further indicated in the next section, the typology of public engagement has been particularly influential in shaping the understanding and debates about the perceived effectiveness and usefulness of a wide range of technologies for public participation in spatial planning. In particular, it differentiates one-way communication flow (i.e. "consultation") from actual dialogue (i.e. "participation") between citizens and professional planning organisations. While useful in delineating differences between different modes and purposes of engagement, such differentiation between public consultation and public participation can lead to further discrepancies in the way the terms are used in the academic literature and in participatory planning practice. For instance, UK practitioners contend that high public consultation standards evade easy pigeonholing as simple one-way feedback from citizens about proposals (R. Jones, 2017). Other practitioners have argued whether "communication" and "consultation" should even be considered a form of public engagement (Carson, 2008).

Notwithstanding, the general heuristic value of the typology remains multiple: it can support the diagnosis, design, as well as the critical evaluation of participatory planning processes.

12.17 References

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13 Appendix II – Description of individual DPPs

This section describes the individual platforms investigated in the thesis. The descriptions present the platform/technology type, licensing mode, and typical use-cases in urban planning.

13.1 3D geoparticipation platforms

Despite four years of observation and monitoring of the 3D geoparticipation applications used in "real-life" urban planning processes since 2015, only one truly participatory 3D platform was identified.

13.1.1 *CityPlanner*

CityPlanner is a 3D visualisation and project management software that has been adopted by a number of city agencies in several Nordic countries, but primarily in Sweden. The software has been provided as a license by Stockholm-based Agency9 (now Agency9-Bentley Systems since 2018). *CityPlanner* began initially as 3D Maps, which provided a 3D map environment for the whole of Sweden with a view to make 3D visualisation and navigation accessible to all without requiring any coding skills. The software package includes the dialogue/engagement module, which was first used for public participation at the cities of Gothenburg and Norrköping in 2012. The participatory platform is web-based. While earlier versions of the participatory platform required users to download plug-ins and was heavier to load and navigate, the current versions are fully web-based, and run more smoothly thanks to WebGL technology. Some of the main use-applications of the 3D geoparticipation platform have been in Norrköping, Gothenburg, Stockholm, Espoo and Umeå.[59] *CityPlanner* features a back-end design tool for all aspects, but no back-end data analysis and management tool. Citizen input data on the platform can be exported for analysis as Excel/CSV files. Although national 3D datasets are available (e.g. with the Swedish Ordnance Survey *Lantmäteriet*). Citizen input on the platform is open/public, or restricted by invitation with URL link.

13.2 2D geoparticipation platforms

The platorms listed in this section predominantly faciliate geoparticipation platforms, although they often also enable text-based surveys and additional functionalities.

13.2.1 *Bästa Platsen*

[59] See Hjerpe et al. 2018 for an academic evaluation of the CityPlanner engagement projects in Stockholm and Norrköping.

Bästa Platsen[60] is a geoparticipation service provided by the Stockholm-based urban planning & design consultancy Spacescape. The platform was launched in 2013, and has been used in 18 projects, mostly in Swedish local councils, but also by various other institutional clients. Being a consultancy service, it does not provide any back-end design tool to clients. The platform is developed and maintained externally by a partner. Compared to other geoparticipation platforms (e.g. *Maptionnaire* and *Carticipe*), the interactive functionalities are limited. The consultancy provides a wide range of complementary services, such as various in-person engagement and outreach methods, various forms of spatial analysis (e.g. space syntax, sociotope mapping), and urban planning services (e.g. plan draft and design proposals). Although the consultancy advocates providing a package of in-person and online engagement services to clients, for practical reasons clients often conduct in-person community engagement themselves. The consultancy is considering the development of a centralised engagement portal with geoparticipation as one of its core modules.

13.2.2 *Carticipe-Debatomap*

Carticipe-Debatomap is leveraged by the Paris-based urban planning and community engagement consultancy Repérage Urbain. The consultancy was founded in 2005, and began providing community engagement services in 2008. The geoparticipation platform was launched in 2014, and has been used for a wide variety of urban planning and regional planning across France, with exceptional cases abroad (e.g. Sherbrooke). The platform is developed and maintained externally by a partner. Being a consultancy service, it does not provide any back-end design tool to clients. The consultancy advocates a dual in-person and online approach to geoparticipation, whereby all in-person participation is uploaded onto the platform. While ensuring transparency and broader participation, the platform also serves as a centralised data storage tool for the consultancy. The citizen input data is analysed in GIS and/or Excel, either by the consultancy itself upon clients' request, or by local third party consultancies that provide similar in-person community engagement services. For practical reasons, the adoption of *Carticipe* by city and regional agencies is often procured via local community engagement firms. Citizen input on the platform is open/public. Participatory functionalities are varied. For example, users can choose from a range of thematic icons and augment their contributions with images and URL links.

13.2.3 *Harava*

60 See here for the entire list of Bästa Platsen geoparticipation projects http://www.spacescape.se/webbdialog/

Harava[61] is a geoparticipation platform leveraged by Sitowise, an urban design, environmental engineering and construction management and surveying company based in Espoo, Finland. *Harava* has also been used in Australia.

13.2.4 *Mapping for Change*

Mapping for Change[62] is a research-based, community mapping and advocacy consultancy co-founded by Louise Francis and Pfr Muki Haklay with strong links with University College London, including the Extreme Citizen Science research group. The majority of M4C projects have centred on community mapping and citizen science (e.g. air pollution monitoring). The consultancy provides a range of services, including community engagement, spatial analysis and visualisation, and mapping. The consultancy also provides guidance about and conducts in-person events in a variety of contexts in the UK and internationally. The 11,000 Homes consultation project at the London borough of Southwark is their main project dealing explicitly with urban planning.

13.2.5 Mapseed

Mapseed[63] is a US-based geoparticipation platform that provides both a back-end design tool and data-analysis and management dashboard. It has been used for participatory budgeting, urban planning and land management.

13.2.6 *Maptionnaire*

Maptionnaire is a pioneer research-based 2D geoparticipation or PPGIS platform that has been used in over 5000 projects since its inception as an online platform. The tool originates in participatory mapping research in the late 1990s and 2000s led by Marketta Kyttä at Aalto University in the Helsinki region, Finland. The first online mapping surveys were first developed in 2005. In 2014, *Maptionnaire* became available commercially with a Software as a Service (SaaS) license with a back-end design tool. The tool has been used for a wide range of urban planning and research projects. In urban planning, it has typically supported early preliminary engagement. In research, it has supported various types of spatial analyses. Wherever possible, *Maptionnaire* staff and colleagues at Aalto University have conducted academic evaluations of the use of the tool in urban planning.[64] *Maptionnaire* has been primarily used in Finland, but also has been widely used across the globe. As of the time of thesis writing, the platform does not feature any developed data analysis and management tool. Citizen input data is typically analysed in GIS and/or Excel. *Maptionnaire* use-

61 https://www.sitowise.com/en/services/smart-city/Harava

62 https://mappingforchange.org.uk/our-company/

63 https://www.mapseed.org/features

64 See for example Kahila-Tani et al. 2019 for an evaluation of 200+ projects and Kahila-Tani et al. 2016 for an assessment of the use of the tool for the Helsinki Masterplan.

applications are typically map-based surveys that can feature various levels of background information and text-based and image-based survey tools. A popular tool is the drawing functionality which enables users to draw lines (e.g. routes) and polygons (e.g. areas). Participation can either be fully individual (i.e. users interact individually without seeing other users' comments), or open/public (i.e. all citizen comments are made visible). The consultancy is considering broadening the use of *Maptionnaire* for the full life cycle of planning projects, including the development of an elaborate data management and analysis back-end tool.

13.2.7 *PlaceChangers*

PlaceChangers[65] is a geoparticipation start-up founded in 2016 with projects located in the UK, with at least two projects in Newcastle (e.g. Ouseburn Valley, Byker Trust). Projects have focused on urban regeneration and community development.

13.3 Multifunctional/generalist platforms

Platforms in this section are predominantly multifunctional/generalist. As they feature a wide range of functionalities, they may also feature geoparticipation functionalities, which are sometimes more limited than those provided by bespoke geoparticipation platforms.

13.3.1 *Bang the Table* – Engagement HQ

Bang the Table[66] is an international community engagement consultancy founded in Australia in 2007 by Matthew Crozier, Karthik Reddy and Crispin Butteriss. The platform is now used internationally, primarily in Australia, New Zealand, India, the US, Canada, and since 2018 in the UK. In the US, the platform has grown to almost 100 clients since its inception in 2016. It features both a back-end design and data analysis and management tool.

13.3.2 *Cap Collectif*

Cap Collectif[67] is a Paris-based community and civic engagement consultancy founded by Cyril Lage. Initially, it began in 2013 as the advocacy platform *Parlement et Citoyens* ("*Parliament & Citizens*") which aimed to connect citizens with national policy makers. The platform gained political clout and has continued to support national policy making and consultations (e.g. on the Digital Republic in 2015; on the Pensions reform in 2018; and on purchasing power in 2019 as a result of the nationwide Yellow Vests protests). In parallel, the city of Rennes commissioned a participatory budgeting platform in 2015, following which the platform became a market leader in the French Civic Tech

65 https://PlaceChangers.co.uk/

66 https://www.bangthetable.com/about-us/

67 https://cap-collectif.com/

landscape. While it is most well-known to have facilitated an ever-growing number of participatory budgeting processes across France since 2015, the platform is often used as a generalist engagement portal by local and regional governments. The platform features both a back-end design and data analysis and management tool, although most citizen input data is typically analysed in Excel. The vast majority of projects are located in France.

13.3.3 *Citizens Foundation*

Citizens Foundation[68] is a non-profit social enterprise founded in 2008 as a civil society organisation with the aim to restore trust and transparency in local and national policy-making. It grew in conjunction with the election of independent candidate and comedian Jón Gnarr as mayor of Reykjavik. The Open Source platform has been used for policy-making at the local, regional and national levels. At the local level, common uses include participatory budgeting and agenda-setting / e-petitions. The landmark participatory budgeting at the city of Reykjavik was launched in 2011. The platform is used internationally by a range of local and national government organisations. The platform features a back-end design tool but as of January 2019 it did not feature a significant data analysis and management tool.

13.3.4 *Commonplace*

Commonplace[69] is a London-based community engagement consultancy that was the first of its kind at the time of its launch. Beta use-applications of *Commonplace* were applied in 2013 at two London boroughs (East Shoreditch and West Hampstead). The platform is most well-known for its geoparticipation component, but is also widely used for non-geoparticipation online consultations about design proposals. The platform has evolved over time and now functions as an online engagement platform that can support the full life cycle of planning projects. It provides both back-end design and data analysis and management tools. The platform can also be used in "survey mode" for in-person interviews in the field. Waltham Forest was its first use-application at a council-wide level and has become a landmark consultation project in the UK. Most projects are located in the UK, ranging from the neighbourhood to national rail level, but the platform is also being used abroad.

13.3.5 *coUrbanize*

CoUrbanize is a Boston-based generalist engagement platform. The platform is used both by local government, architecture firms, planning firms and property developers. Most projects are located in the US and Canada. Beyond back-end design and data analysis and management tools, and significant

68 https://www.citizens.is/about-cf/

69 https://www.Commonplace.is/about

functionalities for providing information and feedback, the platform also enables users to send text messages directly to the platform from their mobile phones.

13.3.6 *Decidim*

The Open Source platform *Decidim*[70] has been developed at the city of Barcelona beginning in 2015, under Ada Colau's mandate as mayor of Barcelona. As of December 2018, over 70 local and regional government agencies had adopted the platform, mostly across Europe. Due to the international popularity of the platform, the MetaDecidim community has grown as an advocacy network of developers and participatory planning professionals, guided by strong participatory local democratic principles. Members of the community contribute to and/or benefit the mutualised development of new modules and share best practices and other experiences with each other. The strong advocacy principles of the community is embodied in its Open Source model, which defines itself against corporate models and proprietary software licenses that are common in the civic tech industry. In France, an official provider of the platform to local government is the Paris-based digital engagement consultancy Open Source Politics.[71]

13.3.7 *MetroQuest*

13.3.8 *Neighborland*

Boulder-based social enterprise *Neighborland* was co-founded in New Orleans in 2010 by three influential participatory planning activists: Dan Parham, Tee Parham and Candy Chang. While initially working mostly with grassroots advocacy organisations, about 90% of projects are now with various government organisations in the US and Canada. Over the years the firm has retained its advocacy mission to "empower people to shape their neighbourhoods". The platform features both a back-end design and advanced data analysis and management tools. The firm advocates a synergy between digital and online engagement.

13.3.9 *Stickyworld*

Stickyworld was founded by architect Michael Kohne and functions as a versatile collaboration tool for use by a wide range of organisations, from small teams and mini-publics to consultations with the general public.

13.4 Bespoke platforms

70 See here for an overview and history of Decidim: https://docs.decidim.org/whitepaper/en/decidim-a-brief-overview/
See here for the MetaDecidim community https://meta.decidim.org/?locale=en

71 https://opensourcepolitics.eu/

Bespoke platforms typically concern participatory budgeting projects. Some platforms, such as *Cap Collectif,* are mostly associated with participatory budgeting in local and regional councils in France, but several city agencies use the platform to host all their digital engagement projects (e.g. Grenoble metro, Rennes).

13.4.1 Bagneux PB

The Bagneux participatory budgeting platform was developed specifically for Bagneux municipality as a one-off application by a Paris-based IT and digital marketing company (ComTown). Although the initial platform architecture could not cater for a later request to include a forum functionality, other modules could be added (e.g. a feedback to the public tab with project status bars). Bagneux PB launched its second cycle in 2019.

13.4.2 Dessine-moi Toulouse

Dessine-Moi Toulouse [‘Draw me Toulouse’] is a bespoke community engagement and stakeholder collaboration platform used to support a suite of proposal bids for the innovative regeneration and retrofitting of key sites across the metropolitan region. Launched in 2018, and developed in partnership with the French IT and graphic design company Mediapilote, the aim of the platform is to support all stages of the bidding process as well as project delivery and implementation.

13.4.3 Grenoble PB – in-house

The Grenoble participatory budgeting platform[72] was developed by IT department in collaboration with an IT consultancy after having initially adopted the now seemingly defunct platform “*Nous Rassemble*” in 2015. The aim to have an in-house platform was twofold: to reduce costs compared to a proprietary SaaS licence, and to be able to manage and customise all content and modules internally. Due to the stringent security specifications set by elected officials, the voting component of the participatory budgeting is outsourced to an expert service provider.

13.4.4 Flexite – Malmö initiativet

Flexite provides a range of software solutions for companies and local government, including e-Petitions and citizen ideation, and is based in northern Sweden.

13.4.5 Myopencity – jeparticipe.toulouse

The online engagement portal for the city of Toulouse is a bespoke Open Source experimental platform of which application is procured from the Toulouse-based company Myopencity. Online consultations on the engagement portal are area/neighbourhood based. Since 2019, the platform also hosts the city’s first participatory budgeting cycle, which is also an experimental trial. The city’s

72 https://www.grenoble.fr/552-budget-participatif.htm

portal is connected to, but fully distinct from, Toulouse metropolitan agency's own digital engagement portal. As such, it enables seamless access for Toulouse residents to city-related engagement projects for which planning competencies sit with the metropolitan agency.

13.4.6 NYC PB – PoePublic & D21

The participatory budgeting platform for New York City is a dual technological application that uses *PeoPublic* for the project ideation and geoparticipation components, and *D21* for the voting phase. PoePublic[73] is a small engagement consultancy based in the US. D21[74] is a larger international software provider based in Czech Republic, and has expertise in participatory budgeting. After the city of Chicago, New York City is one of the pioneer cities in the US for participatory budgeting, having launched its first cycle in 2011. The participatory budgeting process became institutionalised at the city council in cycle 4, and the choice of platform for the voting component has changed over time.

13.4.7 Paris PB – in-house

Similar to the Grenoble PB platform, the current Paris participatory budgeting platform[75] is a collaboration between the city's IT department and external IT firms (Lutèce for the end-user interface and Eudonet for the back-end design and data management tools). The initial platform used for the first iteration of the participatory budgeting in 2014 was a CRM software which soon became unsuitable to manage the large volumes of citizen project proposals (i.e. 5000 citizen project ideas in 2015). The current platform was first developed and has been successively upgraded since the winter of 2015-2016. The rise in participatory planning practices at the city of Paris have been at least partly associated with the mandate of Anne Hidalgo as mayor of Paris since 2014.

13.4.8 Transformcity

Transformcity/Zo!city[76] is an experimental, multifunctional platform for community engagement and stakeholder collaboration deployed for the Amstel 3 district in Amsterdam, Netherlands. The platform is leveraged by Zo!City, founded by influential urbanist and technologist Saskia Beer.

73 Only Poepublic's Github repositories could be found: https://github.com/poepublic/

74 https://en.d21.me/

75 https://budgetparticipatif.paris.fr/bp/

76 https://zocity.transformcity.com

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